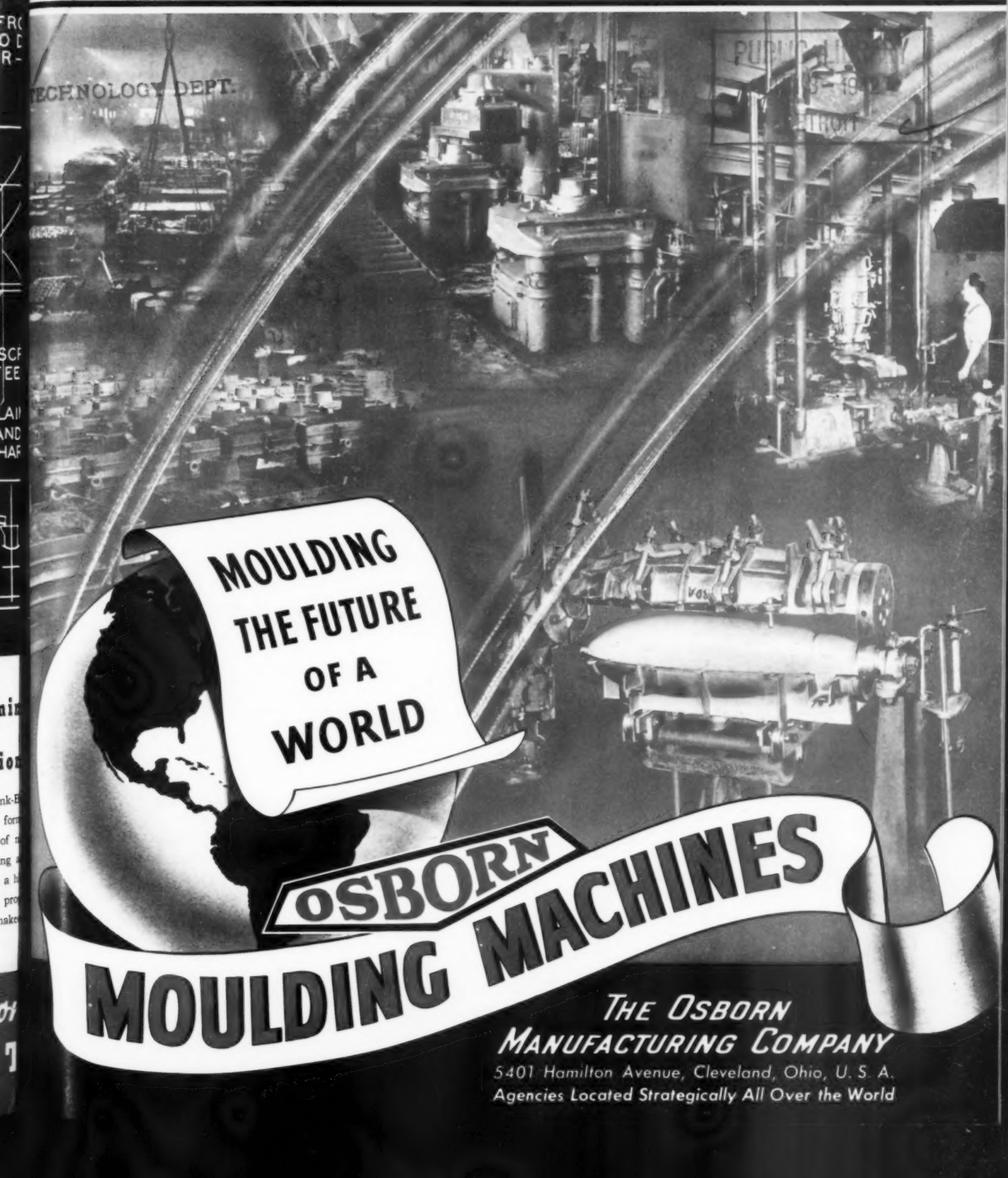
June 1942

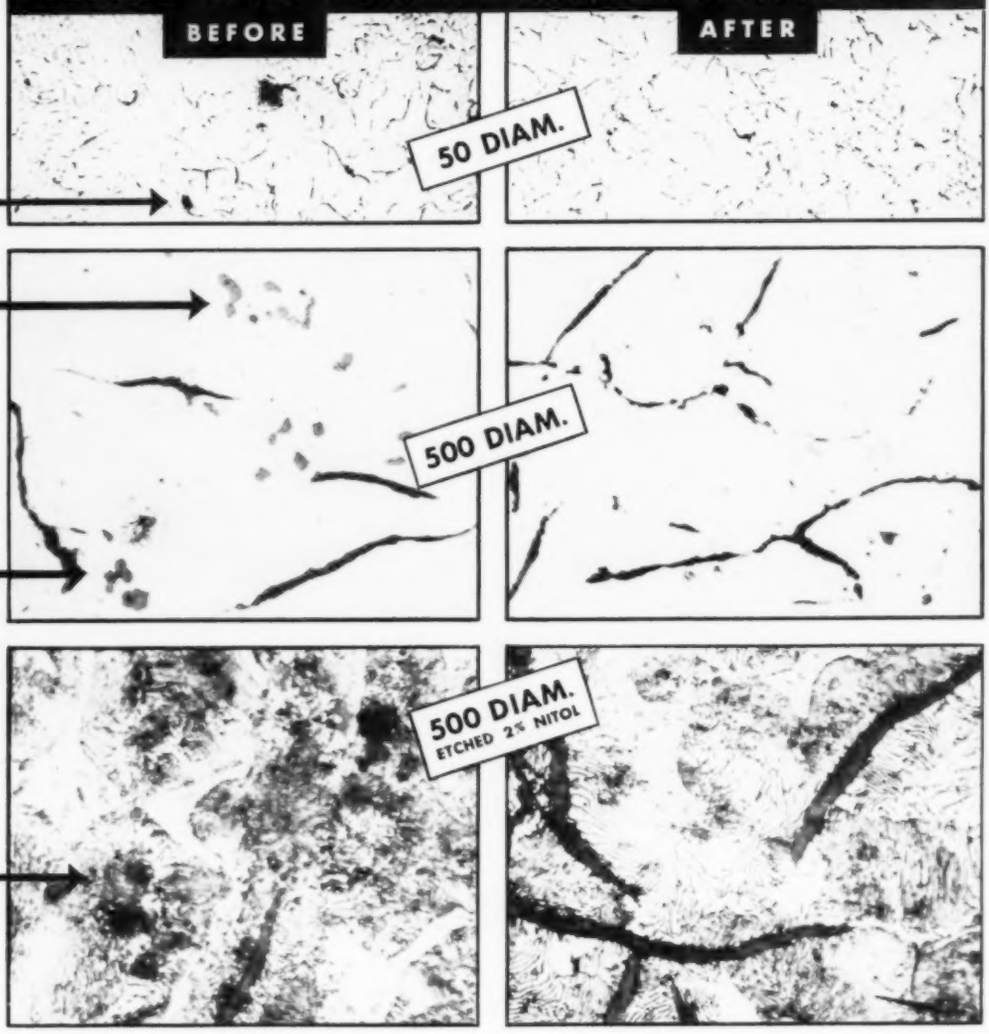
THE FOUNDRY

FIFTIETH YEAR



WASH OUT IMPURITIES...INCREASE STRENGTH AND MACHINABILITY...IMPROVE GRAIN STRUCTURE

REFINE WITH PURITE—THE SCIENTIFIC FLUX



These micrographs show the structure of a 100% scrap mixture, before and after refining with PURITE in a covered teapot ladle —4 lbs. of PURITE per ton. Note how PURITE washes out inclusions and eliminates segregation of impurities. The refining reduces sulphur, and prevents porous defects and hard spots in castings.

ANALYSES AND TESTS

	BEFORE	AFTER
Sulphur	0.137%	0.104%
Combined Carbon	.93	.79
Graphitic Carbon	2.45	2.57
Total Carbon	3.38	3.36
Silicon	1.84	1.83
Manganese	.30	.27
Phosphorus	.53	.54
Tensile Str. Sq. In.	32020 lbs.	33750 lbs.
Brinell Number	226	220
Machinability	30*	20*

*Time in seconds required to drill through 1" test bar with ¼" twist drill at 50 pounds pressure and 1700 R.P.M.

● The speed-up in national defense has increased the demand for high test gray iron and semi-steel castings that machine easily and take a high polish. That PURITE will produce a strong, clean casting with high finishing qualities from an all-scrap mixture is in itself proof of its refining value as applied to ordinary foundry mixtures.

PURITE—whether used in the cupola charge or in the new elongated teapot ladle—washes out impurities and improves the soundness and machinability of gray iron and semi-steel castings.

Let us show you how to improve your castings by refining with PURITE, The Scientific Flux. Write us today.

PURITE
THE SCIENTIFIC FLUX
THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42ND STREET, NEW YORK, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

P. A. system speeds blast-furnace control

Something new has been added to the desk of our blast-furnace superintendent at Bethlehem—a microphone.

Now, in less than two minutes, the super can talk not only to *any* man in his department, but to *every* one of his 175 helpers on a given shift. There's a powerful loudspeaker and a microphone in every key location in the string of furnaces, engine houses, power stations and hot stoves which make up the blast furnace division of the plant.

Control of every phase of operation is tightened up by the new P. A. system. Precious minutes are saved—and when you're running a string of blast-furnaces, minutes . . . even seconds . . . count big.

Instant communication between all parts of the blast-furnace department—which incidentally would be invaluable in an emergency—is saving thousands of dollars' worth of blast-furnace gas by rerouting it quickly to soaking pits, engine houses, heat-treating furnaces, or other units where it can be put to work. And, through closer control of operations, the Public Address system is helping to produce more and better pig iron, at a time when pig iron is vitally needed.

Right now, every pound of iron Bethlehem makes is of course being allocated to war production. But after the war, when trade once again flows through peacetime channels, such advances in production methods as this new rapid system of communication, applied under war conditions, will help Bethlehem better to serve its customers in every field of industry.

BETHLEHEM STEEL COMPANY

VICTORY!

194?

(Fill in your OWN last figure)

WE refuse to believe anything but that the United States will emerge from this war victorious. When? Well, our business is foundry supplies, and we hardly qualify in the field of predictions—that's why we say "Fill in your own last figure."

We are certain of this though: The more efficiency there is in our foundries, the lower that last figure will be!

With the foundry industry playing such a large role in our Victory Program, it can't be otherwise.

Helping foundries to become more efficient is our part in this program. A big share of our assistance comes from the two products described below: Federal Green Bond and Charleroi Seacoal. Read about them now.

CHARLEROI SEACOAL—When you want a better seacoal for cleaner castings—try Charleroi. Users have cut costs up to 20% with Charleroi.

FEDERAL GREEN BOND —The best of bentonite. Easier to control because it's uniform. You can't buy a better sand bond than Federal Green Bond!

Better Supplies for Better Castings

THE FEDERAL FOUNDRY SUPPLY CO.

4600 East 71st Street • Cleveland, Ohio

CHICAGO · CHARLEROI, PA. (Seacoal Plant) · CHATTANOOGA, TENN. · DETROIT · MILWAUKEE · MINNEAPOLIS · NEW YORK · ST. LOUIS · RICHMOND, VA. · UPTON, WYO. (Mines)

THE FOUNDRY

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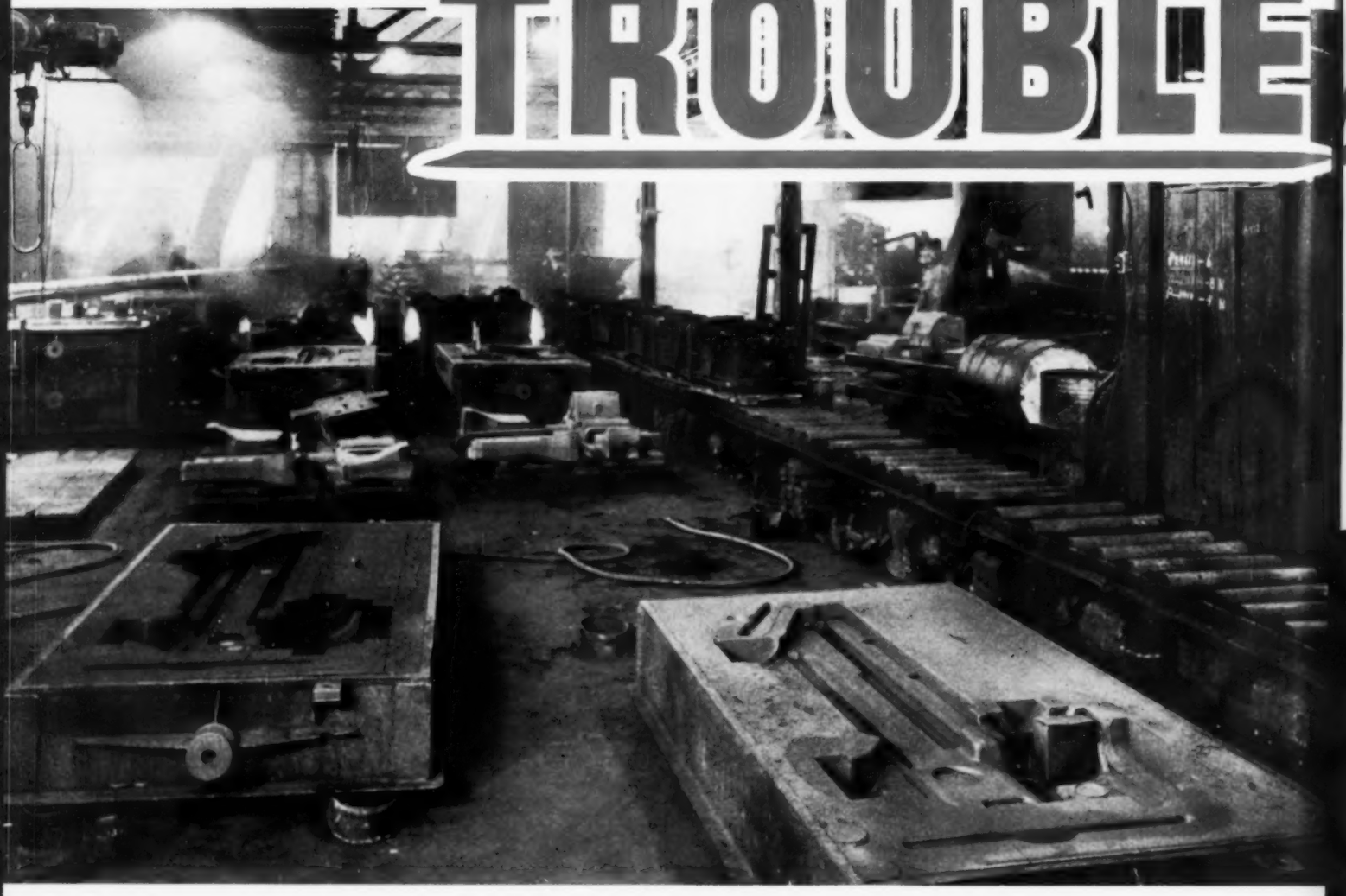
TROUBLE



LINOIL

THE LOGICAL OIL

Foundrymen like Ferro that have used Linoil 25 years or more probably can't even remember what core oil troubles are like; while foundrymen who are unfamiliar with Linoil probably imagine that all foundrymen have to put up with the same core oil annoyances that they do. Linoil the trouble ender. One thing is certain, that if variety is the spice of life nobody need look for that kind of spice in Linoil, because Linoil is unvarying, unchanging, always the same, uniform, absolutely dependable. You need reliable Linoil today.

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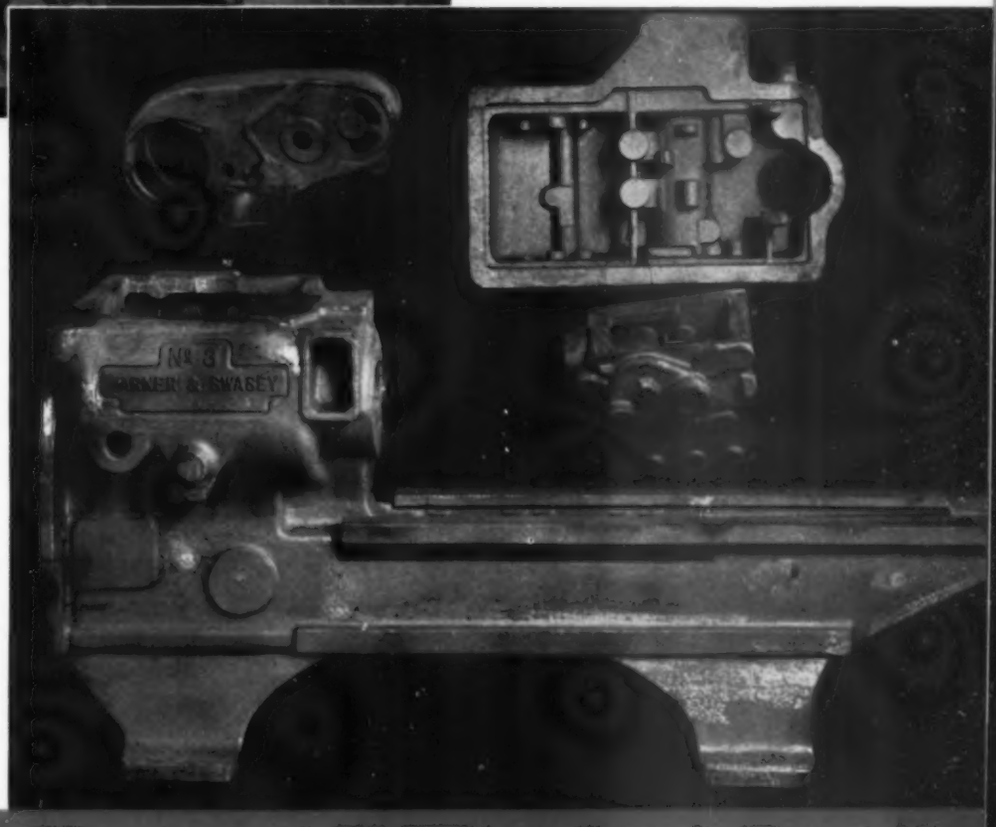
WERNER G. SMITH, LTD.
Factory and Office
200 Fairbanks Ave. Toronto, Ont.

WAR SCHEDULES? USE LINOIL

KEEP 'EM FLYING

coming, Hitler!

LINOIL CORES at The Ferro Machine and Foundry Company, Cleveland, help make the castings that make precision machine tools that make the munitions of war that must crush the marauding madmen. If Hitler and Hirohito could make a tour of American foundries today they might well tremble in their blood-mired boots at what goes on. America girds for war in deadly earnest. Not with boasting and warwhoops, but with hammer, and lathe, and ladle, does the grim day of reckoning come on apace. War, War!



THE FERRO MACHINE & FOUNDRY COMPANY
CLEVELAND, OHIO

Pictures on this page show cores and castings for a Warner & Swasey Company lathe. Picture of molding floor on other page shows two copes and drags, with cores ready for assembling, a closed mold, and two molds that have just been poured.

THE WERNER G. SMITH COMPANY
(DIVISION OF ARCHER-DANIELS-MIDLAND COMPANY)
2191 West 110th Street — Cleveland, Ohio

WORLD'S LARGEST MANUFACTURER OF BLAST

PANG

PANGBORN CORPORATION . . . . . .

AMERICA, HURRY!"

Pearl Harbor! Wake Island! Singapore! BATAAN! MANDALAY! BURMA ROAD! CORREGIDOR!!
Lost--because we sent "too little, too late".

TANKS, PLANES, SHIPS, GUNS, SHELLS AND BOMBS are the sinews of war. If they are not produced in COUNTLESS NUMBERS—BY OUR FOUNDRIES—TODAY AND TOMORROW—THE WAR MAY SOON BE LOST. AMERICA, HURRY!

Speed PRODUCTION! *Speed* DELIVERIES! *Speed* SHIPMENTS!

★ HOW can foundrymen SPEED more goods to the Yanks? One important way is to check-up facilities for cleaning castings, forgings and other metal parts. If the slightest bottle-neck to production is discovered—ELIMINATE IT AT ONCE.

★ HOW? Let Pangborn show you. Show you the vital services the ROTOBLAST Barrels, Tables and Cabinets—the Air Blast Rooms, Cabinets and Special Equipment—the Dust Collectors and Control systems are performing for others daily.

★ One ROTOBLAST Barrel just installed replaces twenty-three tumbling mills—and in eight hours cleans more work than the combined mills turned out in twenty-four—and does the job BETTER—at a LOWER COST.

★ A ROTOBLAST Table cuts cleaning time on fragile castings 50 percent—ELIMINATING THE WASTE THAT FORMERLY CAME FROM REJECTS DUE TO BREAKAGE AND WARPAGE.

★ A manufacturer of bombs finds it easy to clean the inside and outside of these weapons since he asked Pangborn to help him—AND NOW HIS PRODUCTION IS THREE TIMES WHAT IT USED TO BE.

★ Pangborn technical, sales and research facilities are available to help you SPEED UP PRODUCTION—the benefits of thirty-eight years experience as the World's largest manufacturer of Blast Cleaning and Dust Control equipment are yours for the asking. Use Pangborn help to get MORE OF EVERYTHING MADE OF METAL TO THE YANKS. THE WAR WON'T WAIT! *AMERICA, HURRY!*

CLEANING AND DUST CONTROL EQUIPMENT

BORN

. . . . . HAGERSTOWN, MARYLAND

"CHAMPION" of the Seas Convoys the "CHAMPION" of the Foundry

"ROUGH SEAS"
Official U.S. NAVY Photo

A "Champion" has landed. Far across the submarine infested seas, Champion Core Blowers are doing their part to win the war which means freedom for the world—man's inalienable right to life, liberty and the pursuit of happiness.

"Champions" Require No Long Period of Training

That is why they are in such great demand for War Work. Any man, woman or child can economically produce perfectly rammed cores on a *Champion Core Blower*. You merely set the box, pull the lever and in a second the core is perfectly rammed. Small or large, the ramming time is the same and *every core is rammed the same.* Unparalleled accuracy and uniformity is assured.

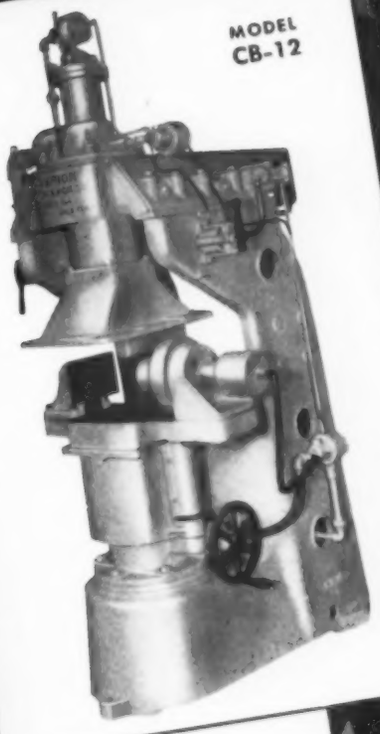
A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle. Rigid one-piece, cast steel frame insures accurate alignment of core box and blow plate. Exclusive Air Operated Hydraulic Clamp (patented) locks the core box securely against split box separation. Instantaneous blow valve action produces 25% more blow power, decreases air leakage and prevents pressure dissipation,—some of the reasons *Champion Core Blowers* successfully produce cores that have been stumbling blocks for others.

CHAMPION

FOUNDRY & MACHINE CO.

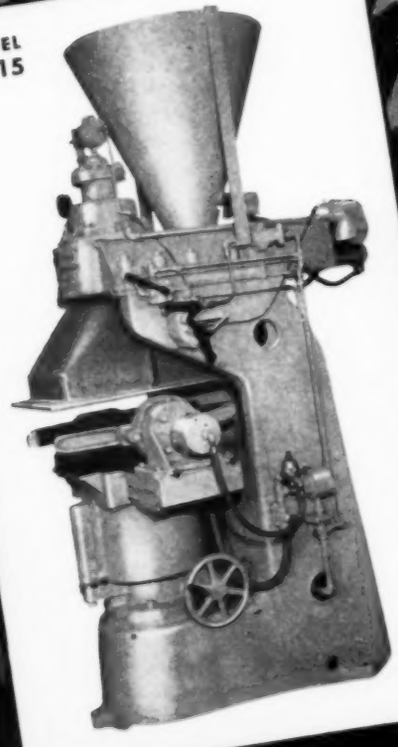
1318 W. 21st Street
CHICAGO, ILLINOIS

MODEL
CB-12

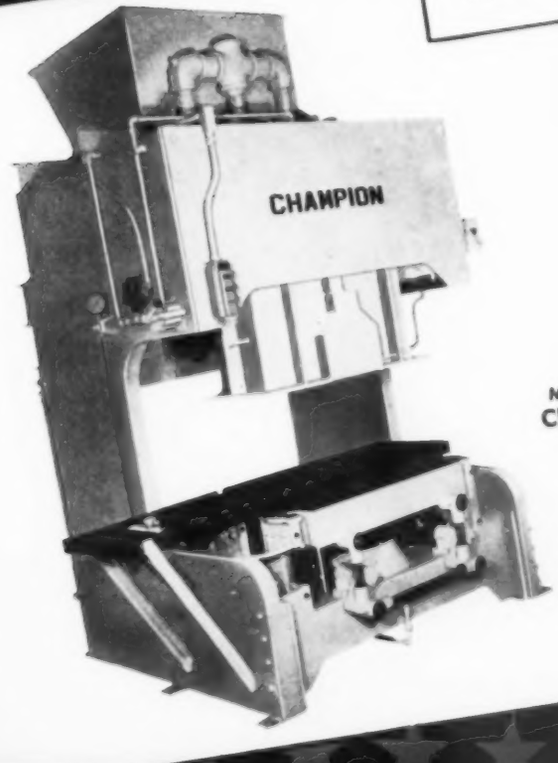


MODEL
CB-8

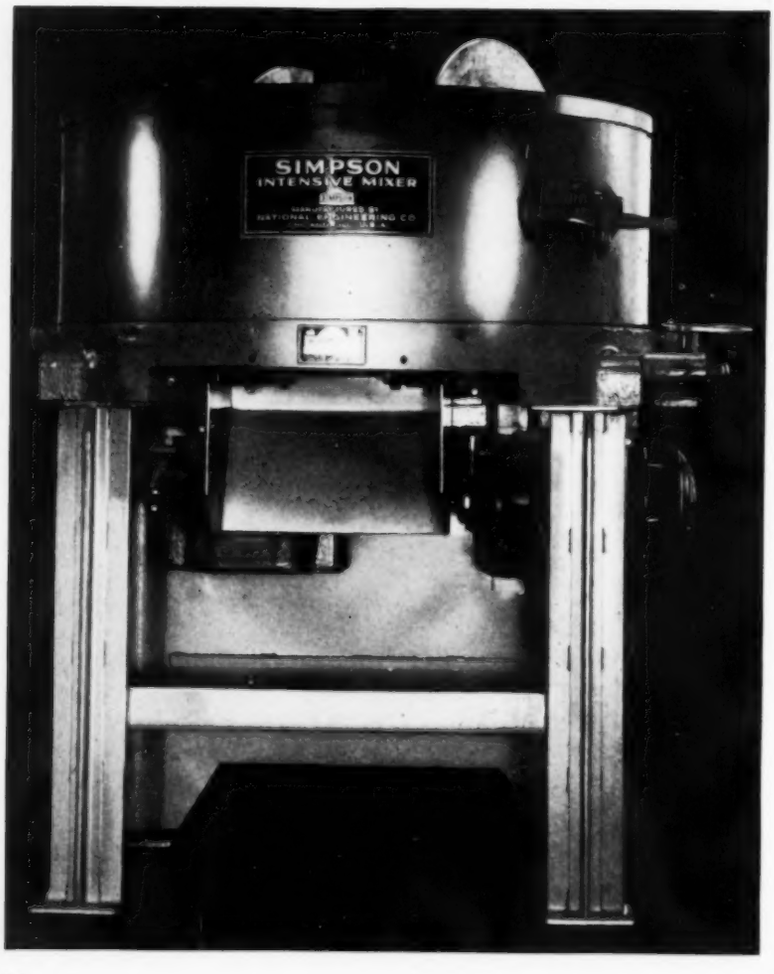
MODEL
CB-15



MODEL
CB-400



. . . Increase Production and Cut Costs by using SIMPSON INTENSIVE MIXERS

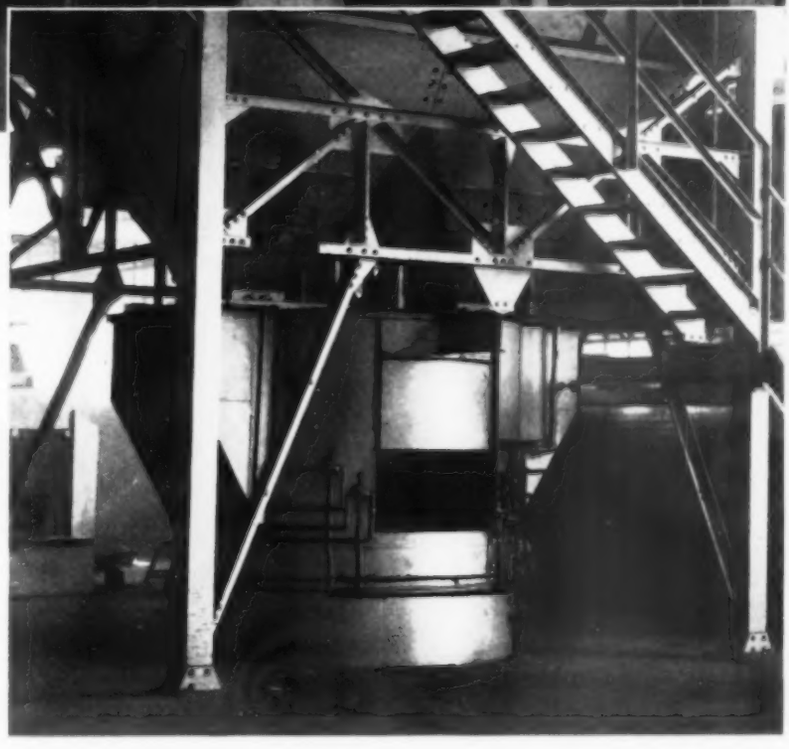


• Today's production of planes and engines for the Army, Navy and Marine Corps would soon fall off if any one of the vital parts were lacking. That's why it is so important for foundries producing aluminum and magnesium castings to keep production at maximum speed 24 hours a day.

One proved way to assure maximum production at minimum cost is to utilize Simpson Intensive Mixers and auxiliary equipment for the correct preparation by mulling of core, facing and system sands. Through their use, you can control the extremely close tolerances and high quality surfaces to meet aircraft requirements. The mulling principle of mixing also helps to reduce and eliminate the formation of clay "pellets" which form in most aluminum sands, as well as to provide close control of moisture and strength with minimum amounts of new sand and moisture required for workability on both aluminum and magnesium sands.

Let us show you how Simpson Intensive Mixers can give you positive "controlled mixing" for all classes of sand, to help you boost output, and to help "Keep 'Em Flying". Write for complete details.

•



• *Illustrated above is a view of an installation in a foundry producing magnesium castings. 2 Simpson Intensive Mixers are installed, handling facing, system and core sands. At the right is a view of a No. 3 Simpson Mixer used to prepare up to 45 tons of correctly mulled system sand per hour. At the left on the opposite page is a view of the No. 1¾—5 ft. diam. Simpson Mixer, which offers a capacity of 8 to 10 cubic feet, a new size in the Simpson line.*

SIMPSON

INTENSIVE MIXERS

NATIONAL ENGINEERING COMPANY

MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

CP TOOLS SPEED "CASTINGS FOR WAR" DRIVE

PNEUMATIC RAMMERS, CHIPPERS, GRINDERS, SAVE MAN HOURS

CP Engineers Co-operate in Plant Surveys

NEW YORK (CP)—Time-saving CP Pneumatic Tools and the services of Chicago Pneumatic engineers are aiding foundries in their drive for greater production.

Production of CP pneumatic tools for the foundry have been raised to new peaks. Chicago Pneumatic engineers are co-operating in plant surveys — checking pipe lines for proper size, seeing to it that the right size of hose is used with each tool, eliminating water from air lines, tightening connections and stopping air leaks — doing every thing they can to help foundries get proper air pressure at point of use.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York, N. Y.

↑ **CLOSE CONTROL OF RAMMER BLOW** . . . instant acceleration from a fast hard blow to a very rapid, light stroke — or vice versa — insures fast, efficient ramming. CP Sand Rammers are available in floor, bench, ingot and pipe mold models, in sizes to meet every foundry need.

↑ **FOR CLOSE QUARTER WORK** . . . for getting into small holes . . . CP has a complete line of high speed, small grinders. For data on these and other types of Chicago Pneumatic grinders, CP sand rammers and other pneumatic tools, write for a copy of Catalog 564.

WITH SUSTAINED SPEED → under load . . . light weight, true balance and wide ranges of sizes and models, Chicago Pneumatic Grinders meet every foundry need.

←FOR CHIPPING CASTINGS and cleaning out cores, there's nothing faster than CP Chipping Hammers. Available in a wide range of sizes.

CHICAGO PNEUMATIC

PNEUMATIC TOOLS

ALSO: Air Compressors, Electric Tools, Rock Drills, Hydraulic Aviation Accessories, Diesel Engines

WRENCHES
DRILLS
REAMERS
RIVETERS
CHIPPERS
GRINDERS

THE DURATION of the war depends on how quickly and abundantly our armed forces are equipped. Guard closely, that final and all-important step in your core department—BAKING. Use Carl-Mayer Ovens! They bake faster and perfectly, protecting cores against under-baking or burning which cause casting rejects and consequent delays in production schedule.

REPEAT ORDERS FROM AMERICA'S LEADING FOUNDRIES AVERAGE MORE THAN *THREE* PER CUSTOMER. Ask to see a Carl-Mayer Engineer or send for Bulletin 141.

CARL-MAYER OVENS

Typical Carl-Mayer Customers

ALUMINUM CO. OF AMERICA
AMERICAN MAGNESIUM CORP.
AMERICAN RADIATOR CO.
BABCOCK & WILCOX CO.
BUCYRUS-ERIE CO.
BROWN INDUSTRIES CORP.
DUNKIRK RADIATOR CO.
ECLIPSE AVIATION DIVISION OF BENDIX AVIATION CORP.
ELECTRIC AUTOLITE CO.
FORD MOTOR CO.
FOX FURNACE CO.
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FRANK FOUNDRIES CORP.
FREMONT FOUNDRY CO.
G & C FOUNDRY CO.
GENERAL MOTORS CORP.
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OHIO INJECTOR CO.
PACKARD MOTOR CO.
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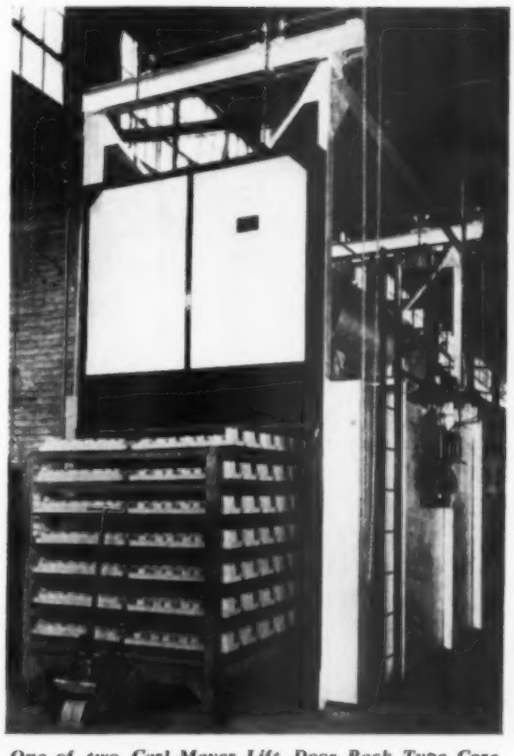
STUDEBAKER CORP.
UNION METAL & MFG. CO.
WHITEN MACHINE WORKS
WHITING CORP.

CORE AND MOLD OVENS, ALL TYPES AND SIZES

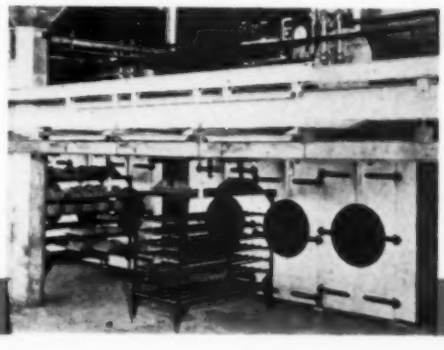
Over 20 Years' Experience

THE CARL-MAYER CORPORATION
3030 Euclid Ave.
Cleveland, Ohio

. . .



One of two Carl-Mayer Lift Door Rack Type Core Ovens at Fremont Foundry Co.



Part of large Carl-Mayer Rack Type Core Oven installation at The General Electric Co.

It's up to You to remove every Handicap in this

RACE FOR PRODUCTION

Only by out-producing our enemies can we win this war—and we MUST win this war, so it's up to you to remove every obstacle and every handicap in this race for production. Hermans can help you speed production by increasing the capacity of your molding department. Increased production of 300%—400%—500% has not been unusual with the aid of Herman Molding Machines and improved layout. These Herman features provide low-cost rapid production—

Rapid, rotary valve control and automatic timing.

Air clamps instantaneous in action, adjustable to different sizes and heights of flasks.

Smooth, steady hydraulic action for roll-over and pattern draw.

Pattern draw equalizer that automatically locks after adjusting itself to irregularities of flask.

Exclusive, Herman roll-over saves power, cuts time.

Gravity return of roll-over plate saves power.

Mold deposited directly on roller conveyor. Invite a Herman engineer in to discuss your molding problems. No obligation.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

Overhead Sand Return
saves valuable floor space for other work

• Bartlett-Snow Overhead Distributing Systems for returning tempered sand to the molders permit a much more orderly and more profitable operation than would otherwise be possible.

For Belt Distributing Systems — usually preferred when sand is to be distributed to a relatively small number of large hoppers such as those used with flask fillers, etc. — Bartlett-Snow has developed a special design of troughing and flat carrying idlers specially for foundry service. The discharge is effective with either one-way plows which divert the sand to one side only, or the larger capacity two-way plows. Both types are designed to minimize belt wear.

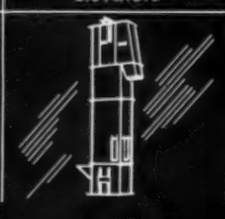
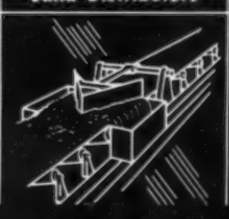
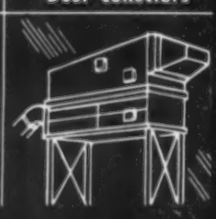
Flight Distributing Systems, used preferably for filling a long row of small molders hoppers, or to avoid the spillage sometimes encountered from the return run of a belt distributor, drop the sand into the molders hoppers through openings in the bottom of the trough — and can be arranged to carry sand in both directions if desired.

Our recently issued 40-page Foundry Bulletin No. 91 illustrates many different Distributing Systems and other Bartlett-Snow Foundry Equipments. Copies are available on request.

THE C. O. BARTLETT & SNOW COMPANY
6201 Harvard Avenue **Cleveland, Ohio**
Engineering and Sales Representatives in the Principal Cities

BARTLETT-SNOW
ENGINEERS AND FABRICATORS FOR THE FOUNDRY INDUSTRY

Complete Sand, Mold and Castings Handling Equipment for any requirement, including

Shakeouts	Elevators	Aerators	Sand Distributors	Bins and Feeders	Apron Conveyors	Dust Collectors
						

What will you do
if your present fuel supply is cut off?

★

Prepare for that day by installing North American Gas-Oil Burning Systems now.

For 25 years North American has built both Gas and Oil Equipment: Blowers, Fuel-Air Proportioning Devices, Control Valves and Burners.

★

THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES

CLEVELAND, OHIO

MACKLIN
GRINDING WHEELS

Are made in ALL sizes and shapes . . . in ALL grain and grade combinations, for EVERY grinding operation.

Macklin Grinding Wheels

will

"PROTECT YOUR PRODUCTION"

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

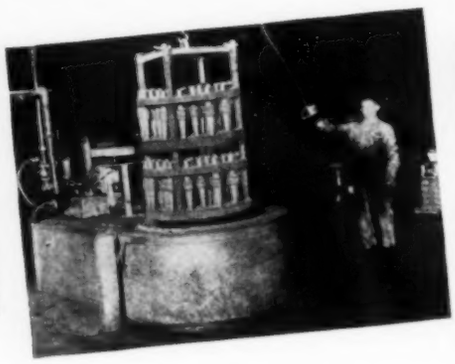
Distributors in all principal cities

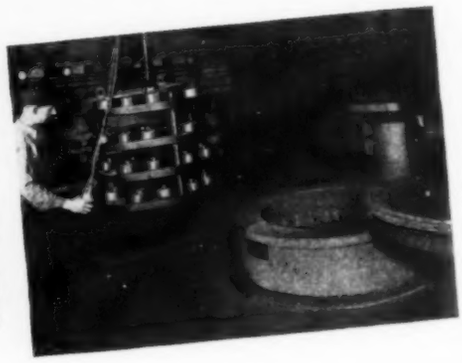
Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

NEW HEATING PRINCIPLE BLASTS TRADITION!

SUPER-CYCLONE FURNACE

INCREASES PRODUCTION • KEEPS WORK STRAIGHTER • REDUCES HANDLING





ALL THE ADVANTAGES

of 100% forced convection heating

are now available in the annealing, normalizing, and hardening ranges. For years, textbook theories and tradition said that heat could not be successfully transmitted by 100% forced convection heating at temperatures above 1300° F. Lindberg Engineers, with the experience of designing several thousand Cyclone Tempering Furnaces, could see no logical reason for the heat limitation at that point. Twenty-one months ago they built a furnace to disprove it—the first Super-Cyclone. It was a success from the start . . . temperatures to 1750° F. with 100% forced convection heating, and equal heating and control accuracy throughout the range.

In blasting the "it-can't-be-done" tradition, the Lindberg Engineers are now able to offer you a furnace that increases production, keeps work straighter, and reduces handling. In addition, the Super-Cyclone generally requires but ⅓rd the floor space occupied by conventional equipment to handle the same or greatly increased production.

REPLACES 8 FURNACES

Typical of this is the Super-Cyclone shown above. A large midwestern appliance manufacturer was annealing grey iron castings in 8 radiation heated box type furnaces occupying an area 36′ x 9′. Now, one Super-Cyclone, requiring an area 6′ x 9′, *turns out twice as much work in 8 hours as all 8 furnaces had previously done in 16 hours!* One Super-Cyclone using but 1/6th the floor area, actually doubled the production of the 8 older furnaces. One Super-Cyclone's production is 12 times greater per unit of floor space than that of the 8 box type furnaces!

SUPER-CYCLONE

KEEPS WORK STRAIGHTER — reduces handling 83%!

The worm gears shown on the fixture, in the above photograph, are SAE 4140, weigh 20 lbs. each and have a maximum section of 3". They are heat treated to 45 R.C. A load of 100 worms (2000 lbs.) is placed on the fixture, heated in a 38" diameter x 60" deep Super-Cyclone and quenched on the same fixture. The previous method was to heat in a radiation type box furnace with a hearth 36" wide x 5′ deep, holding a maximum of 30 worms at one time. It took 3½ hours to heat the 30 worms in the box furnace. Time to heat the 100 worms in the Super-Cyclone is 4 hours.

The Super-Cyclone and the box furnace require the same floor area, 8′ x 11′. The box furnace turned out 8 gears per hour. The Super-Cyclone turns out 25 gears per hour . . . a production increase of 300%.

STRAIGHTNESS

In hardening the worms from the box furnace, 85% went out between .015" and .025". The high hardness of 45 R.C. made straightening extremely touchy. Straightening 100 worms required 8 hours. In hardening from the Super-Cyclone, *90% of the gears required no straightening whatsoever,* and the balance was out a maximum of .010", easily taken care of in 30 minutes on the press . . . a reduction of 7½ hours straightening time per 100 gears.

HANDLING TIME

In handling 100 worms from the box furnace, 3 man-hours were required for loading, unloading, and quenching individually. In handling 100 worms from the Super-Cyclone, ½ man-hour is required for loading the fixture, quenching, and unloading. *Handling time is cut to 1/6th of what it previously had been!*

SUPER-CYCLONE

INCREASES PRODUCTION 670% — keeps rings round!

Above you see another example of the Super-Cyclone's ability to increase production, reduce handling, and minimize distortion with 100% forced convection heating. The illustration shows a load of 63, SAE 52100 bearing races on a fixture, being charged into a Super-Cyclone. When heated through, the rings will be quenched, fixture and all. When tested, they will be 62-65 R.C. and will be within .006" to .010" of round, the accepted range.

The previous method was to heat in a radiation type box furnace and quench individually on a special jig. This was done to hold the rings to .006" to .010" of round, which is now done in the Super-Cyclone . . . 63 at one time without jigs.

PRODUCTION INCREASED

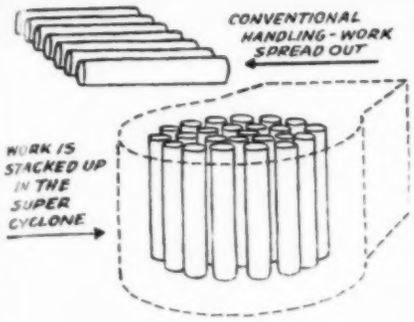
But let's compare the two methods of handling on an 8 hour day basis to give a clearer picture of the Super-Cyclone's ability in helping you to solve your heat treating problems. The box furnace turned out 64 rings per day. The Super-Cyclone turns out 432 rings per day, a production increase nearly 7 times greater than the box furnace. *It would take 7 box furnaces and 7 men to approximate the production of the one Super-Cyclone!*

HANDLING TIME REDUCED

The box furnace demanded the constant attention of one man, but the Super-Cyclone requires the services of a heat treater for only 1½ hours of the day, leaving 6½ hours in which he is free to do other work. In this one plant, Super-Cyclone production is nearly 7 times greater than the box furnace production and handling time is reduced 81%.

LINDBERG ENGINEERING COMPANY • 2453 WEST HUBBARD STREET • CHICAGO

LINDBERG FURNACES

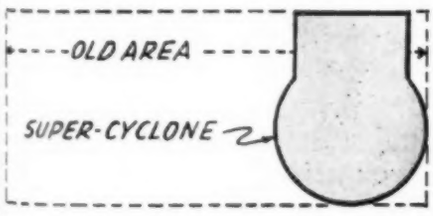


INCREASES PRODUCTION

You can roughly check the production increases possible in your shop through the Super-Cyclone by spreading an average load of parts on the floor, one layer thick, as laid out in a radiation heated furnace. Now, take another load of those same parts and stack them up in a 36" diameter circle, 4' high, making allowance for spacers and supports. Figure it will take a maximum of 3 hours to heat the load and 5 minutes to quench. Ordinarily you will find production increases of 200% to 1000% possible.

KEEPS WORK STRAIGHTER

The 100% forced convection heating principle of the Super-Cyclone means that the work is heated uniformly and accurately by air, driven at high velocity through the charge. The heat source is confined to a separate chamber, away from the work, to prevent radiant heat, of a source hotter than the desired work temperature, from striking the charge and causing distortion. Thus straightening time is eliminated or reduced to a fraction of what is required from conventional equipment and the man-hours previously required for straightening are now available for other work.



LESS FLOOR SPACE

As a conservative thumb rule, you can figure that the Super-Cyclone will require not more than ⅓rd the floor space required by any other equipment to handle the same or greatly increased production. This rule is general, of course, and may not fit all cases. It is based on averages of what the Super-Cyclone has done in other plants. A Lindberg Representative can give you, quickly and accurately, any production figures, floor space layouts, or other information you may need.

STANDARD SIZES IN WHICH THE SUPER-CYCLONE IS AVAILABLE

Delivery time is speeded considerably when standard size furnaces are selected, rather than special sizes which must be drawn up. Drawings are available for the following sizes of Super-Cyclones all of which have been built and are in operation. Most are gas fired, although a number are available electrically heated.

CHAMBER SIZE
16" diameter x 20" deep
22" diameter x 26" deep
22" diameter x 36" deep
25" diameter x 20" deep
25" diameter x 30" deep
25" diameter x 48" deep
28" diameter x 28" deep
28" diameter x 48" deep
28" diameter x 60" deep
33" diameter x 36" deep
33" diameter x 48" deep
38" diameter x 36" deep
38" diameter x 48" deep
38" diameter x 60" deep
43" diameter x 48" deep
48" diameter x 72" deep
60" diameter x 36" deep
60" diameter x 48" deep
60" diameter x 72" deep

SUPER-CYCLONE QUENCHING

When the first Super-Cyclone was being designed, Lindberg Engineers anticipated the obvious problem of mass quenching of heavy loads and devised equipment to take care of the situation. A typical example is the 2000 lb. load of worm gears shown on the opposite page, which is heated and quenched, fixture and all. Jobs similar to this are being quenched, with perfect results, every day in plants all over the country.

Heat treaters who have seen the Super-Cyclone in action, quickly appreciate that to secure all the advantages of which the furnace is capable, the quench must be looked at from an entirely new standpoint. This involves quench tank size, oil velocity, volume of oil, cooling and storage.

Twenty-one months of production experience in our own plant and in the field, with over 100 installations, have enabled Lindberg Engineers to work out an accurate formula which greatly simplifies this problem.

SUPER-CYCLONE HAS WIDE RANGE OF USES

THE TEMPERATURE RANGE of the Super-Cyclone is 250° F. to 1750° F. with equal heating and control accuracy throughout the entire range. Thus it is a highly flexible unit for the small or medium heat treating department, as well as a heavy production unit for the large shop when put to work on one type of job.

Among the operations being handled by over 100 Super-Cyclones already in service are the following:

HARDENING: Typical of the Super-Cyclone's ability to turn out heavy production of touchy parts are the examples shown on the opposite page.

ANNEALING: A large Wisconsin foundry is annealing and normalizing loads averaging 5,000 lbs. One Super-Cyclone 60" diameter x 43" deep turns out 17½ tons of work per day.

NORMALIZING: Because work can be stacked up densely, and quickly heated, The Super-Cyclone is an ideal furnace for normalizing.

TEMPERING: The Cyclone Principle of heating is well known to heat treaters for extremely accurate tempering under heavy production conditions. You can temper in the same furnace that you harden in with perfect heating accuracy for both operations.

NITRIDING: The Super-Cyclone fitted with a retort and cover does the same uniform job of nitriding as the standard Cyclone Nitriding Furnace. In addition, the temperature range of the Super-Cyclone enables the retort to be "cured" without removing from the furnace.

SPECIAL HEATING: Because work can be preheated at any desired rate—and cooled according to a definite schedule, the Super-Cyclone is well suited to stress relieving, spheroidizing, malleablizing and other heating operations requiring a specific cycle.

OVER 100 SUPER-CYCLONES ALREADY IN SERVICE

IMPORTANT NOTE: Like all other Lindberg developments, the Super-Cyclone has been thoroughly proved under 24-hour a day production conditions for a minimum of 12-months before announcement to the trade. Every effort has been made to restrict the sale of these units until the probationary period was completed. In spite of this, however, many of those who have seen the furnace in operation during the past 18-months have quickly been aware of its production possibilities and requested that units be constructed for them. Thus, over 100 Super-Cyclone installations are in service from coast to coast. One or more of these is near you, as is a Lindberg District Office, staffed by practical and competent sales engineers. The Super-Cyclone is *not* a cure all, nor do we represent it as such. It is speeding production, turning out straighter work, and cutting costs for many firms however, and we will be glad to survey its possibilities for you, on your work, at your request.

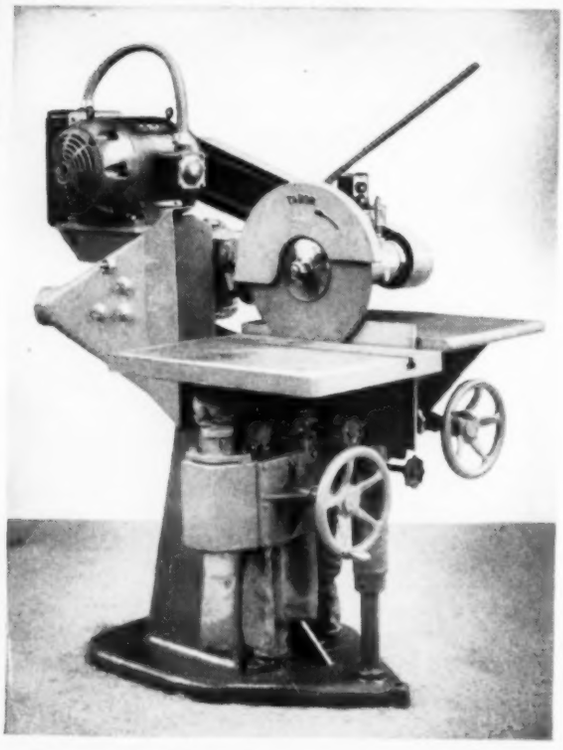
SUPER-CYCLONE FOR ANNEALING, NORMALIZING, HARDENING, AND TEMPERING

HYDRYZING FOR SCALE-FREE AND DECARB-FREE HARDENING

CYCLONE FOR LOW COST ACCURATE TEMPERING

Save PRICELESS TIME *with the . . .*

TABOR-BRASIVE CUT-OFF MACHINE



The above-all need of the day is high and ever higher production. Between pouring and shipping no time can be lost . . . and none need be.

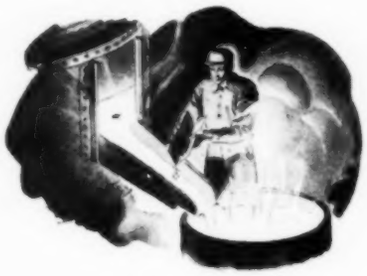
A Tabor-Brasive Cut-Off Machine will more than keep pace with your increased production schedules. It will cut gates and risers from castings of manganese bronze, aluminum bronze, nickel, monel and other tough-cutting metals in a matter of seconds—unbelievably fast. Cuts are clean and close to the casting—snagging and finishing grinding are reduced to a minimum, often entirely eliminated.

Write for information, giving details of your cutting problems. There is a Tabor-Brasive Cut-Off Machine of a size and type to meet your requirements.

THE TABOR MANUFACTURING COMPANY
6225 Tacony Street • Philadelphia • Pennsylvania

Representatives: *Los Angeles, Calif.*, Snyder Foundry and Supply Co.; *Oakland, Calif.*, Pacific Graphite Co.; *Seattle, Wash.*, Carl F. Miller & Co.

Improve your Iron with ladle additions of "SMZ" ALLOY



BY adding small amounts of "SMZ" alloy to cast iron in the ladle, you can get a stronger, tougher iron of better machinability. This balanced alloy of silicon, manganese, and zirconium improves the structure of cast iron, thus improving its physical properties. It also lowers the depth of chill of cast iron, thus softening the iron at corners and in light sections and making it more machinable. The graphs at the right show how "SMZ" alloy raised the tensile strength, the transverse strength, and the deflection, and decreased the depth of chill of the same base iron.

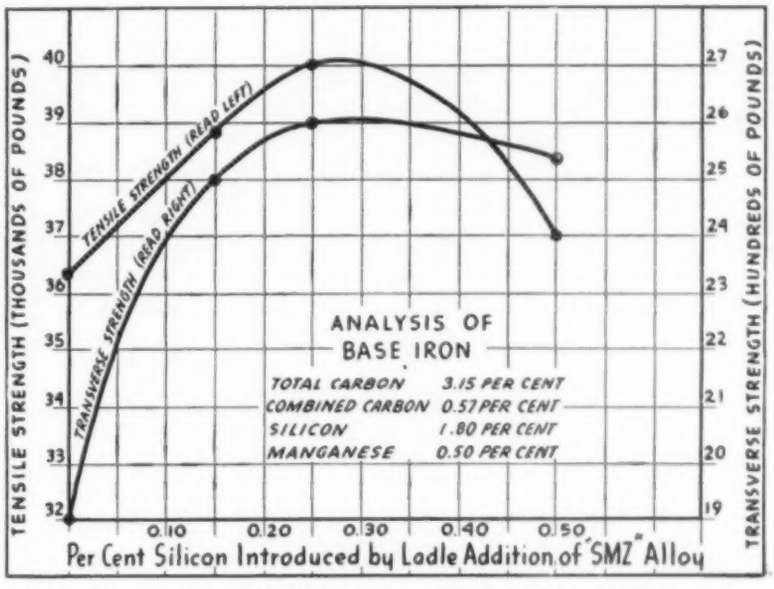
One of our metallurgists will gladly call at your request and tell you more about "SMZ" alloy and how it can improve *your* iron. He can tell you also about the many other "Electromet" ferro-alloys for the foundry and give you practical help in using them to obtain better iron, often at lower cost. This service is yours for the asking.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation

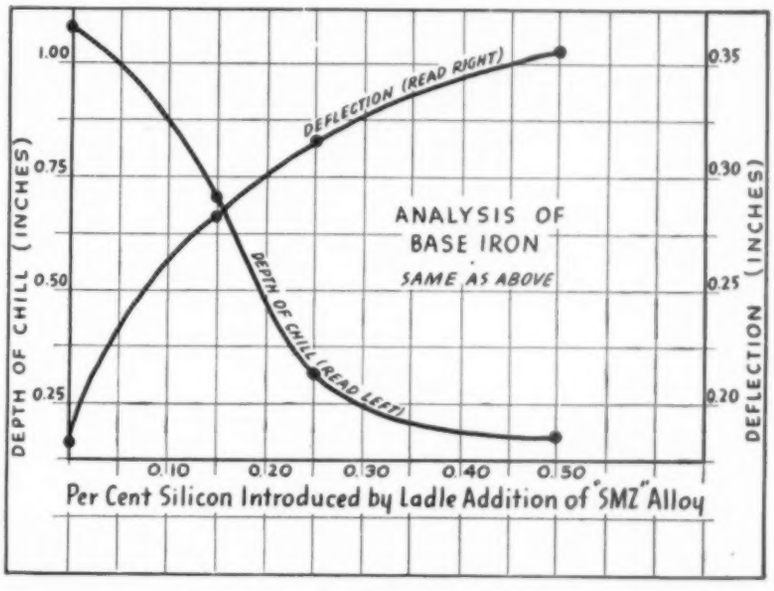
UCC

30 East 42nd Street, New York, N. Y.

The word "Electromet" and the letters "SMZ" are registered trade-marks of Electro Metallurgical Company.


TENSILE STRENGTH (THOUSANDS OF POUNDS)
TRANSVERSE STRENGTH (HUNDREDS OF POUNDS)
TENSILE STRENGTH (READ LEFT)
TRANSVERSE STRENGTH (READ RIGHT)
ANALYSIS OF BASE IRON
TOTAL CARBON 3.15 PER CENT
COMBINED CARBON 0.57 PER CENT
SILICON 1.80 PER CENT
MANGANESE 0.50 PER CENT
Per Cent Silicon Introduced by Ladle Addition of "SMZ" Alloy

Effect of Increasing Ladle Additions of "SMZ" Alloy on Tensile Strength and Transverse Strength of Cast Iron.


DEPTH OF CHILL (INCHES)
DEFLECTION (INCHES)
DEFLECTION (READ RIGHT)
DEPTH OF CHILL (READ LEFT)
ANALYSIS OF BASE IRON
SAME AS ABOVE
Per Cent Silicon Introduced by Ladle Addition of "SMZ" Alloy

Effect of Increasing Ladle Additions of "SMZ" Alloy on Deflection and Depth of Chill of Cast Iron.

Electromet
Trade-Mark
Ferro-Alloys & Metals

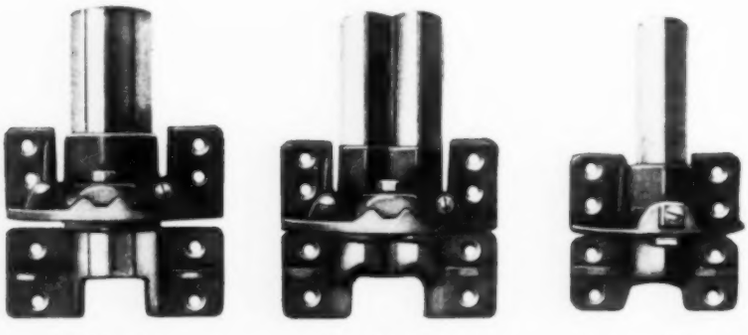
Available through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Adams Cherry Slip Flasks

These flasks are made to your specifications, with any desired length, width or depth. Material is close-grained cherry lumber, with machined malleable trimmings.

The sand strip is special rolled brass, sliding on brass retainers. The two convenient levers provide quick and easy operation.

For greatest efficiency, try the Adams Cherry Slip Flask in combination with Adams Jackets.



Wide "V" Double "V" Narrow "V"

Pins to Suit Your Preference

Wide-V pins are furnished unless otherwise specified. We can supply double-V, narrow-V, round or other styles of pins to conform with your present pattern plates.

The Adams Company

1883—Our 59th Year—1942

800 Foster St., Dubuque, Iowa

MOLDING MACHINES **ADAMS** **FLASK EQUIPMENT**

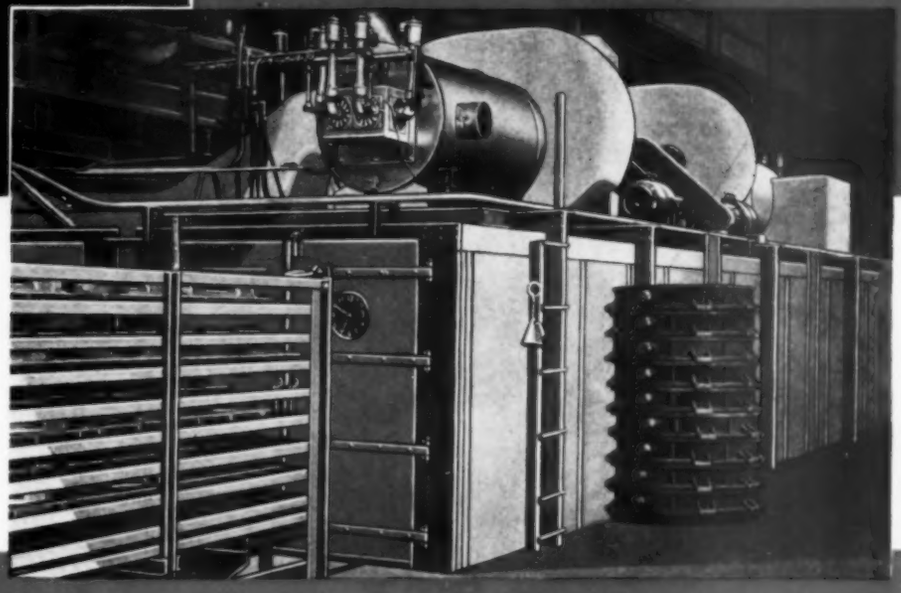
At Times Like These

WHEN FLOOR SPACE IS LIMITED, CHOOSE DESPATCH FOUNDRY OVENS

Inset — Mr. Herbert Larson, Foundry Superintendent at Minneapolis Moline Power Implement Company.

★ ★ ★

Despatch Intermittent Type Rack Loaded Core Oven — Recirculating Type, Gas Heated.



SPEEDY · EFFICIENT · ECONOMICAL CORE BAKING · MOLD DRYING

During these times foundry output is the first worry of every executive. Space limitations require him to select new equipment with a careful eye on how it will fit his present floor space and his production flow and still boost core and mold output.

Many foundrymen have discovered the right answer in Despatch recirculating type core and mold ovens. The oven in the photograph loads at one end—and unloads at the other end which is 40 feet down the production line toward the casting room. A minimum floor space is required, and due to the new Despatch design, the output of cores per oven has been increased tremendously; also definite savings in baking costs per ton have been accomplished.

SHIPMENT ON 6 WEEKS SCHEDULE

Just as the Despatch design was fitted to this production problem of more cores and molds without more floor space, they can be fitted to suit your problem. The Despatch design with cross flow recirculating heat system will speed up output and improve core quality whether it is applied to TOWER TYPE OVENS, CONVEYOR TYPE OVENS, BATCH TYPE OVENS.

Write Today

for your copy of Bulletin No. 31. It contains complete details about many new Despatch Core and Mold Oven features.

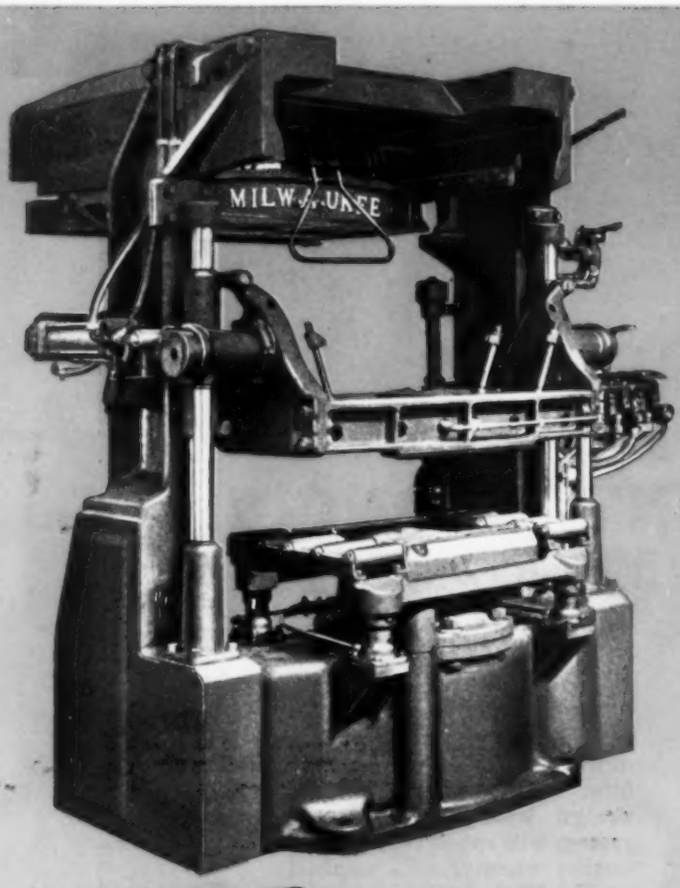
DESPATCH

OVEN COMPANY MINNEAPOLIS, MINNESOTA

"FOUNDRY ENGINEERED" for

High Production War Work

70 to 80 MOLDS PER HOUR ON WAR PRODUCTION LINES –



For DRAGS **No. 217**
JOLT SQUEEZE
ROLLOVER PATTERN DRAW

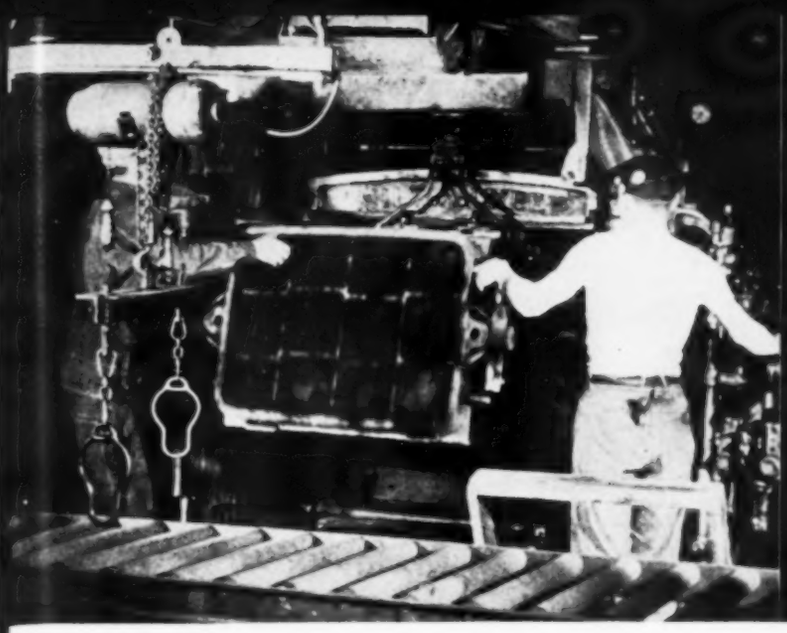
Here is the sensational power rollover, with automatic leveling and a smooth pattern draw, combining Jolt Squeeze, Rollover and Pattern Draw in the simplest possible operating cycle. Speedy, simple, for maximum production.

For COPES **No. 214**
JOLT SQUEEZING STRIPPER

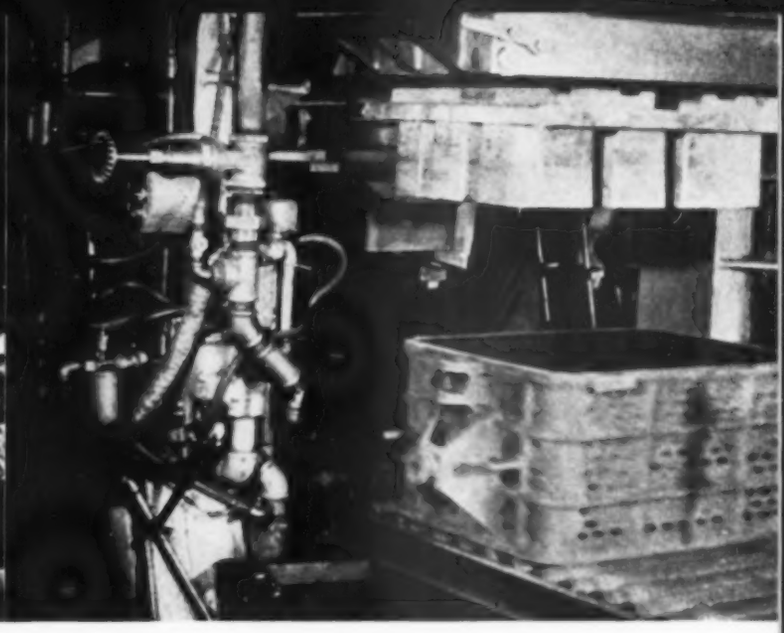
The car suspended squeeze platen permits fully automatic overhead mold removal device . . . none better for fast operation. Fewest jolts required . . . uniform molds assured. Permanently parallel squeezing action without strain on wheel bearings or track. Simple, safe, sturdy and speedy!

MILWAUKEE

MANUFACTURERS OF MOLDING MACHINES AND BRIQUETTING PRESSES



Mold being rolled over on No. 217 Milwaukee Molder. Because of sequence of operations — squeeze before rollover — bottom boards are eliminated.



Finished mold being kicked out on storage roller conveyor of No. 214 Milwaukee Jolt Squeeze Stripper. No time lost between cycles.

TIME IS SHORT! *Production* COUNTS!

To rig for maximum production NOW . . . *ring* for a MILWAUKEE Foundry engineer! It's our job to cooperate with you . . . and here is a pair of machines that permit ideal rigging for maximum production on many jobs now being released to foundries in large quantities. On many war production lines today, these speed molders are each producing 70 to 80 molds per hour, with that ideal uniformity you need to boost production for victory.

On DRAG production, the molds are discharged on a roller conveyor . . . on COPE production, the molds are automatically set on storage rollers at a height convenient for closing. Minimum effort . . . maximum speed . . . and many other features you'll appreciate in these strenuous days of 24-hour PRODUCTION.

As you know, every machine in the complete line of MILWAUKEE MOLDERS is designed, built, sold and serviced by EXPERIENCED FOUNDRYMEN. Let us show you applications of these machines which will speed your molding and core making NOW.

Call in a MILWAUKEE *Foundry Engineer*

Foundry Equipment Co.

3238 WEST PIERCE STREET • MILWAUKEE, WISCONSIN, U.S.A.

"THAT SAND CONVEYOR IS A *JINX!*" He told Me*

* THE REX MAN

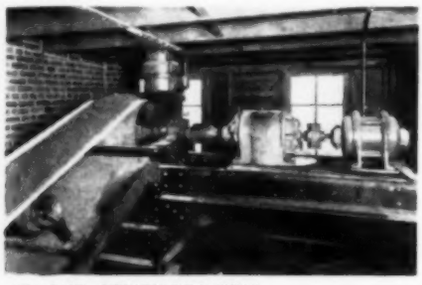
. . . "IT'S ALWAYS NEEDING SOMETHING!"

① **AND IT ALWAYS** will be needing something, I told this foundry engineer whose war contracts had him worried—until you use idlers that will take the kind of punishment you give them. That means, of course, *Rex Idlers!*

② **"DO YOU REALLY** think that they can give better service?" he asked me. "If they can, we'd better get them, because delays now for repairs just can't be tolerated—we *must* keep to our tonnage schedule!"

③ **WELL, THEY CAN!** Foundry men the country over, where quality and dependable service are the first requirements, will tell you how they depend on Rex's rugged reliability and long life. "Second to none," they say.

④ **THE SECRET IS** their design. With their precision, inner-tube-alignment bearings, triple sealed against dust or against oil leakage, they have eliminated a lot of the old worries due to rotting belts and early weave and wobble.



⑤ **AND REMEMBER THIS**—if it ever becomes necessary to replace a Rex idler roll—you buy the roll only. You don't have to buy a complete new unit, because rolls are interchangeable in the same frames. That saves hard cash, too!

⑥ **"WELL, THAT ALONE** is enough to make me consider Rex very seriously. We're having a lot of trouble with these because we must replace the entire unit. I'll check up and chances are you'll find an order from me before very long."

Rex idlers are seeing extensive service in busy foundries these days. The Rex man can help you apply them to your war production plans to best advantage. Naturally, orders bearing highest priority distinction take precedence. Chain Belt Company, 1716 West Bruce Street, Milwaukee, Wisconsin.

REX CONVEYORS

CHAIN BELT COMPANY OF MILWAUKEE

Baldwin-Duckworth Chain Belt Division, Springfield, Massachusetts • Worcester, Massachusetts
Rex Chain Belt and Conveyor Divisions, Milwaukee, Wisconsin

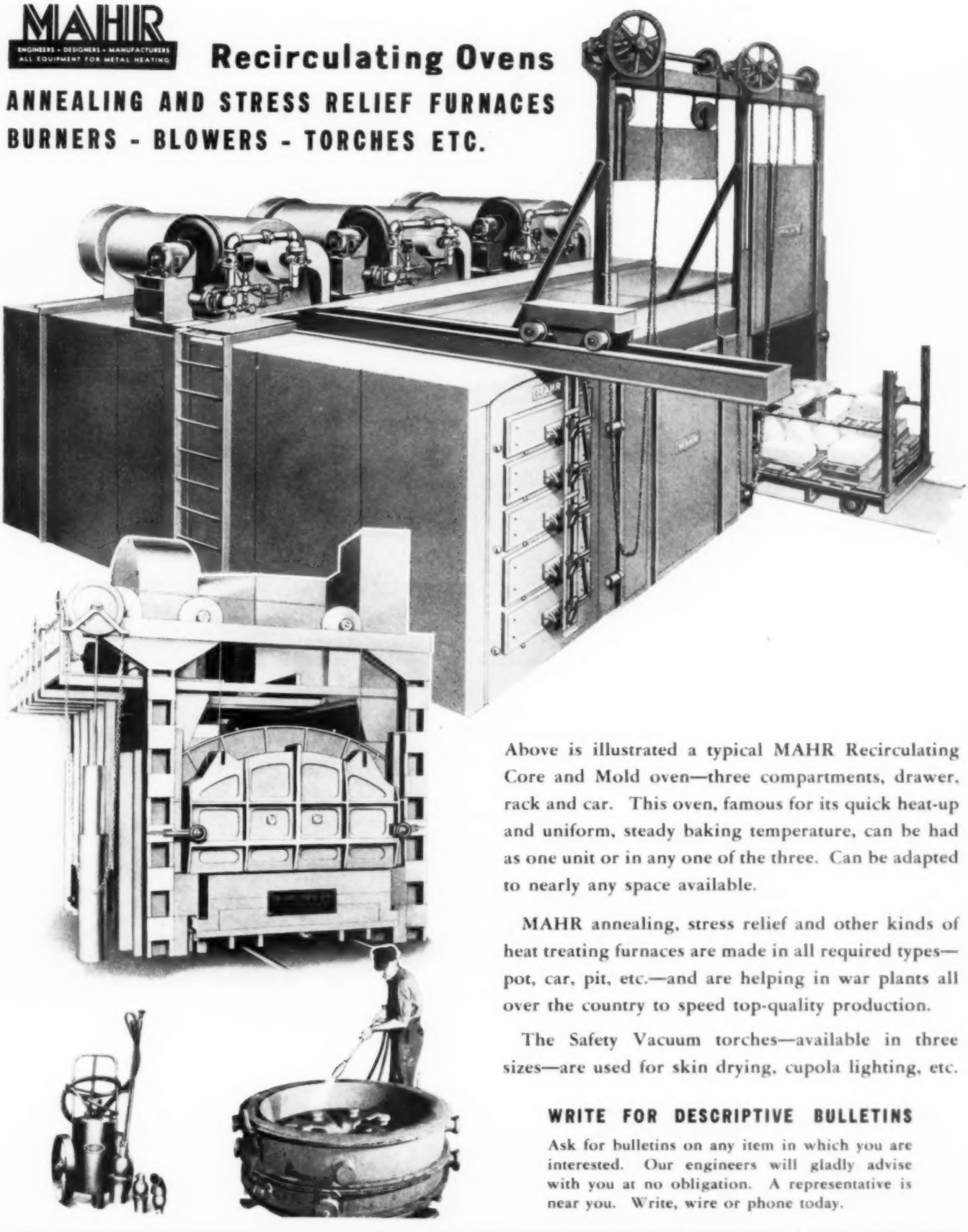
REX CHAIN BELT COMPANY

MAHR

ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

Recirculating Ovens

ANNEALING AND STRESS RELIEF FURNACES
BURNERS - BLOWERS - TORCHES ETC.



Above is illustrated a typical MAHR Recirculating Core and Mold oven—three compartments, drawer, rack and car. This oven, famous for its quick heat-up and uniform, steady baking temperature, can be had as one unit or in any one of the three. Can be adapted to nearly any space available.

MAHR annealing, stress relief and other kinds of heat treating furnaces are made in all required types—pot, car, pit, etc.—and are helping in war plants all over the country to speed top-quality production.

The Safety Vacuum torches—available in three sizes—are used for skin drying, cupola lighting, etc.

WRITE FOR DESCRIPTIVE BULLETINS

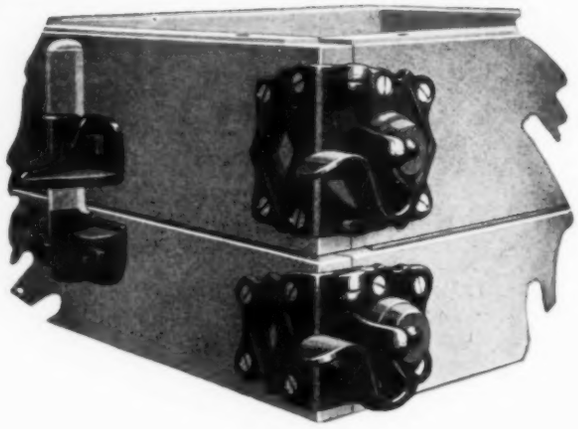
Ask for bulletins on any item in which you are interested. Our engineers will gladly advise with you at no obligation. A representative is near you. Write, wire or phone today.

DIAMAHR

MAHR MANUFACTURING CO.
DIVISION OF DIAMOND IRON WORKS, INC.
MINNEAPOLIS, MINNESOTA, U. S. A.

A *Real* INVESTMENT FOR MORE PRODUCTION!

DIAMOND FLASKS



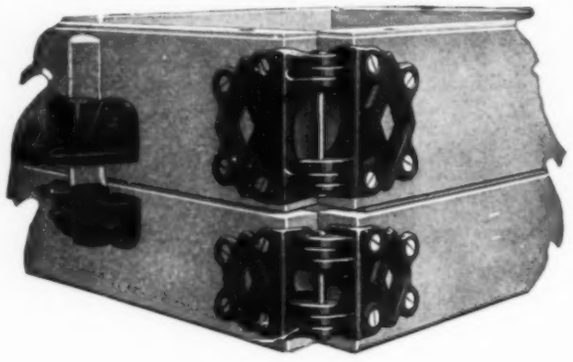
No matter what happens—you'll never be wrong if you equip for production with *good* flasks. Because we can give you many exclusive features in a flask developed over a period of 50 years, it can also be said that, "You can't go wrong on a Diamond," either. Note these important features:

- **A SUPERIOR LATCH** (exclusive)

  It's self-compensating for wear. The tighter you draw it, the firmer the grip. Has special cam which is easily adjustable as extreme wear on parts develops. Only *Diamond* has this patented feature.

- **PRECISION-MADE**

  Made from the finest grade of well-seasoned cherry stock, all flasks are made to precise measurements according to your specifications.



- **A PATENTED HINGE** (exclusive)

  Note the construction of Diamond hinges. The lugs are carefully milled and are interlocking which eliminates "play" no matter how long or how hard the flask is used.

- **SPECIAL SHAPES**

  We regularly supply customers with special shape flasks, including round flasks, and special cut partings.

STEEL JACKETS

Made from Nos. 7 to 10 gauge steel, true to size and taper. Are practically indestructible, and retain their shape under severest conditions. Thousands of these jackets in use.

DIAMOND

CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

The Royer Can Lick Your Sand Problem!

But Royers are efficient in any kind of foundry!

The Shenango-Penn Mold Company, Dover, Ohio, pouring quality monel metal, alloy iron castings and centrifugally cast bronze, now use five Royers in their three foundries.

Three Model NC-2's were purchased from 1936 to 1939. A Royer Junior was added in 1940. Then recently to meet increased production demands, a Model NC-4 was rushed to the rescue to provide more sand conditioned the Royer 6-point way. They are all doing a fine job for Victory through industry.

Sand conditioning in steel foundries pouring at extremely high temperatures presents a different problem from that of foundries casting gray iron or non-ferrous metals. But no matter what the conditions may be, Royer Sand Separators and Blenders meet every demand. They remove scrap and trash from the sand, thoroughly aerate and blend it, providing greater permeability and more even moisture distribution.

"Our sand has a high silica content and high fusion point, and intense heat burns it out much faster than in an iron foundry," reports the Pelton Steel Casting Co., Milwaukee, Wis. "Therefore, we must exercise careful sand control and preparation, or our discarded sand losses would be very high. Our Royers actually save us a considerable sum annually."

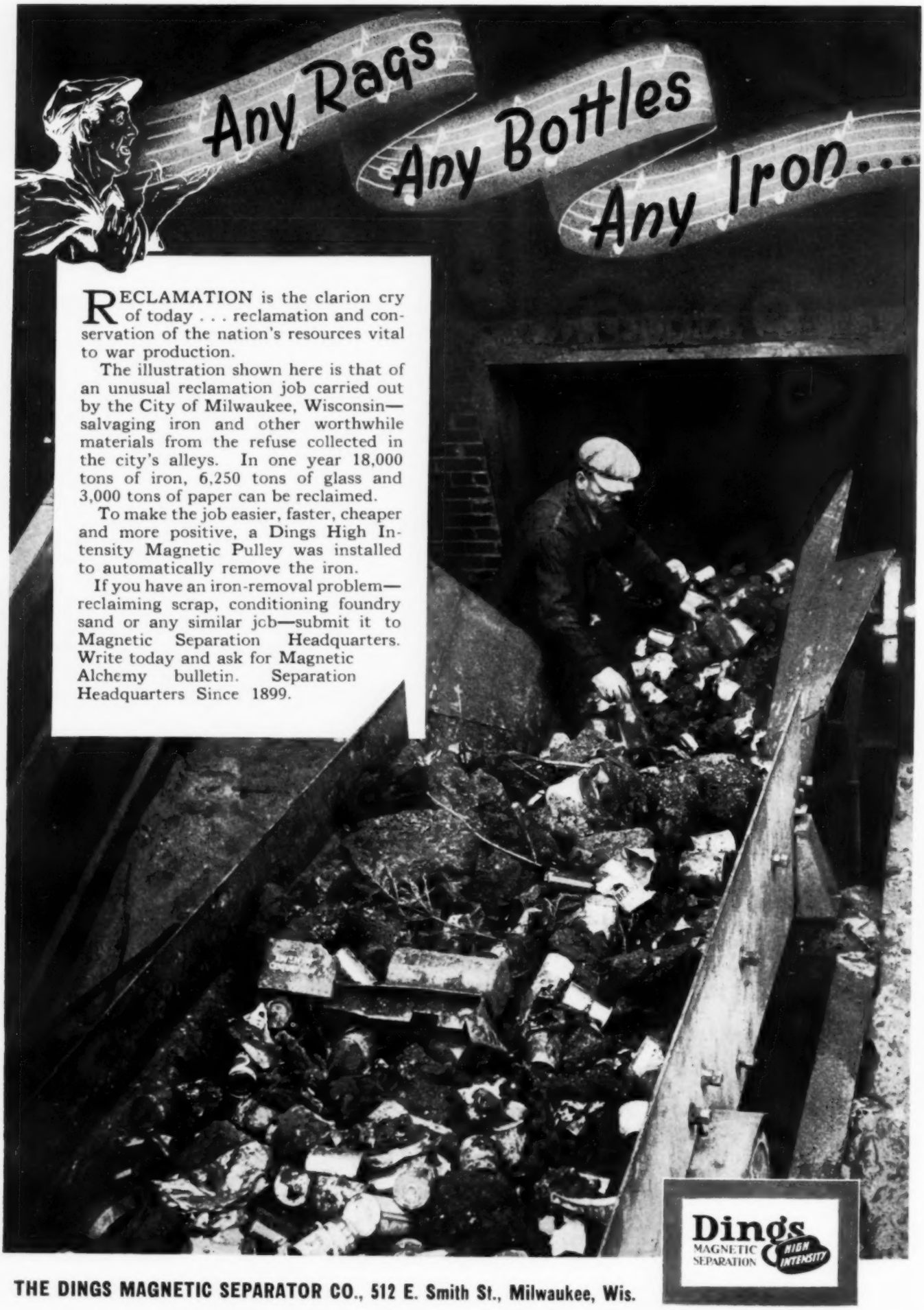
This company has used a Model "NC-2" Royer with highly successful results for several years. Recently, when faced with a greatly increased production program due to war orders, another Royer NC-2 was added. *"That should prove our complete satisfaction with its work under our very exacting conditions,"* said the foundry head.

More Royers are in use today than all other makes of sand conditioning machines combined—over 3,600 are now helping speed foundry operations in America's war effort.

Royers are obtainable in six portable models, four stationary models and two "lift about" combination sand and scrap remover units.

THE ROYER

ROYER FOUNDRY & MACHINE CO. *KINGSTON, PA.*



RECLAMATION is the clarion cry of today . . . reclamation and conservation of the nation's resources vital to war production.

The illustration shown here is that of an unusual reclamation job carried out by the City of Milwaukee, Wisconsin—salvaging iron and other worthwhile materials from the refuse collected in the city's alleys. In one year 18,000 tons of iron, 6,250 tons of glass and 3,000 tons of paper can be reclaimed.

To make the job easier, faster, cheaper and more positive, a Dings High Intensity Magnetic Pulley was installed to automatically remove the iron.

If you have an iron-removal problem—reclaiming scrap, conditioning foundry sand or any similar job—submit it to Magnetic Separation Headquarters. Write today and ask for Magnetic Alchemy bulletin. Separation Headquarters Since 1899.

Dings MAGNETIC SEPARATION HIGH INTENSITY

THE DINGS MAGNETIC SEPARATOR CO., 512 E. Smith St., Milwaukee, Wis.

ROTO DRAWER

GAS FIRED CORE OVEN

A STANDARD UNIT DELIVERED COMPLETE

TEMPERATURE CONTROL

The automatic control of the temperature of rapidly circulated and recirculated air insures a uniform temperature throughout the entire baking chamber—thus making possible a **STEADY FLOW** of cores perfectly baked in less time than ever before possible.

SMOOTH DRAWER OPERATION

The drawers, being entirely supported by externally mounted bearings, operate so easily and smoothly that all possibility of broken cores is eliminated.

DRAWER CAPACITY

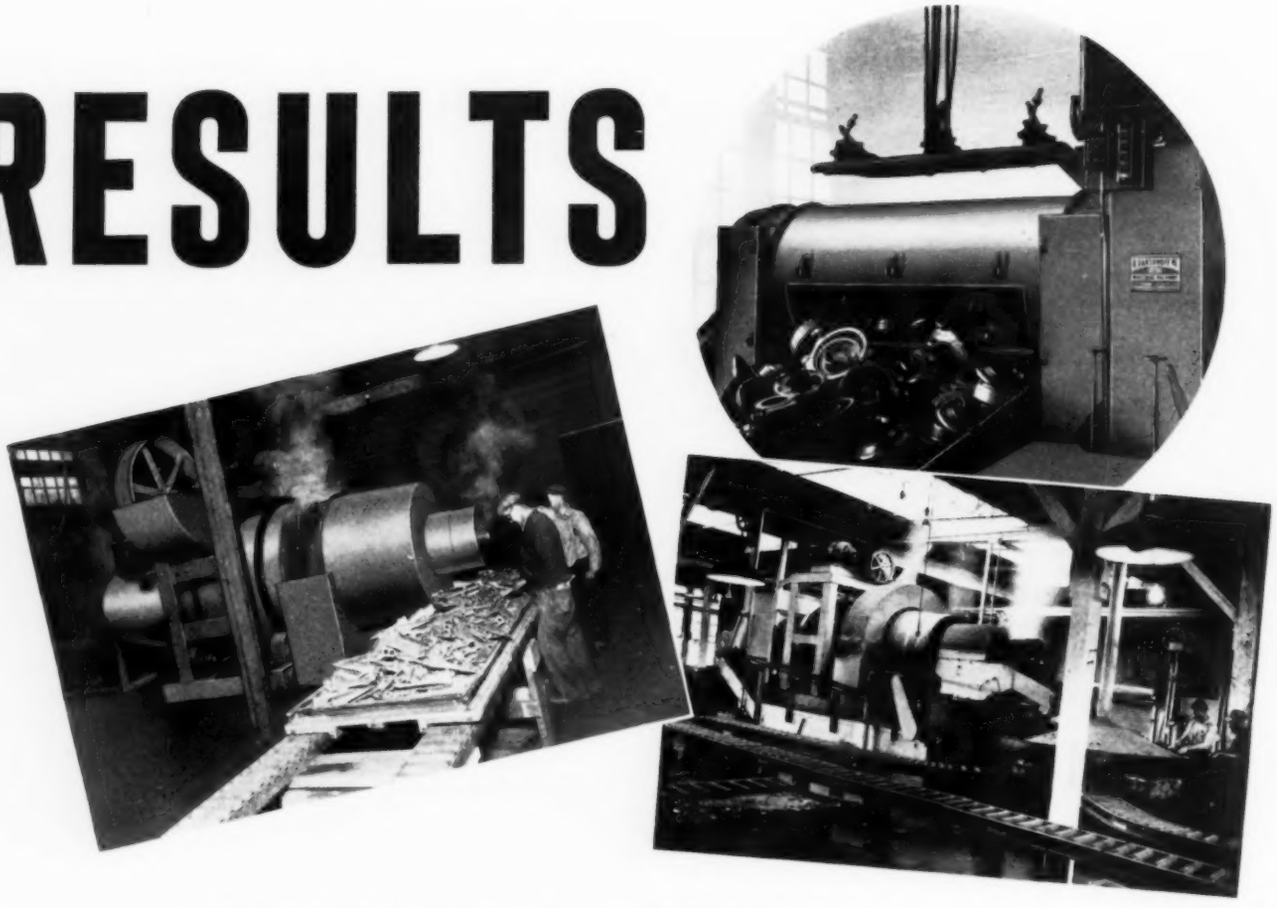
The three large drawers are 8′-0″ diameter and have a capacity of over 1500# of cores 14″ high. The removable drawers are furnished either 4′-0″ diameter (as shown) or 8′-0″ diameter.

With a ROTO-DRAWER you need have no more BURNED CORES

THE CLEVELAND BLOW PIPE & MFG. CO.

6505 CEDAR AVE. **CLEVELAND, OHIO**

RESULTS



from RANSOHOFF *Wet Tumbling* MILLS

Results from Ransohoff Wet Tumbling Mills prove they meet today's demand for better cleaned products in faster time.

Under actual operating conditions in various foundries, Ransohoff Wet Tumbling Mills are cleaning castings faster and more thoroughly at less cost.

There are specific reasons why Ransohoff Wet Tumbling Mills are superior in performance. Dust collecting systems are unnecessary. The cleaning compound wets and carries away the loosened sand, permitting stars to work on hard sand. More stars can be used with less mill wear and air is clean because the dust is stopped at its source.

The star separation and return, which reduce loading and unloading time, are automatic in operation.

Ransohoff Wet Tumbling Mills are everything that is needed to do a good castings cleaning job and do it right.

Write or Wire Dept. "F" for Catalog.

N. RANSOHOFF, INC.

METAL CLEANING SPECIALISTS

TOWNSHIP and BIG FOUR R. R. **CINCINNATI, OHIO**

SUPER MARKETS

MAY BE YOURS WITH CORDIP

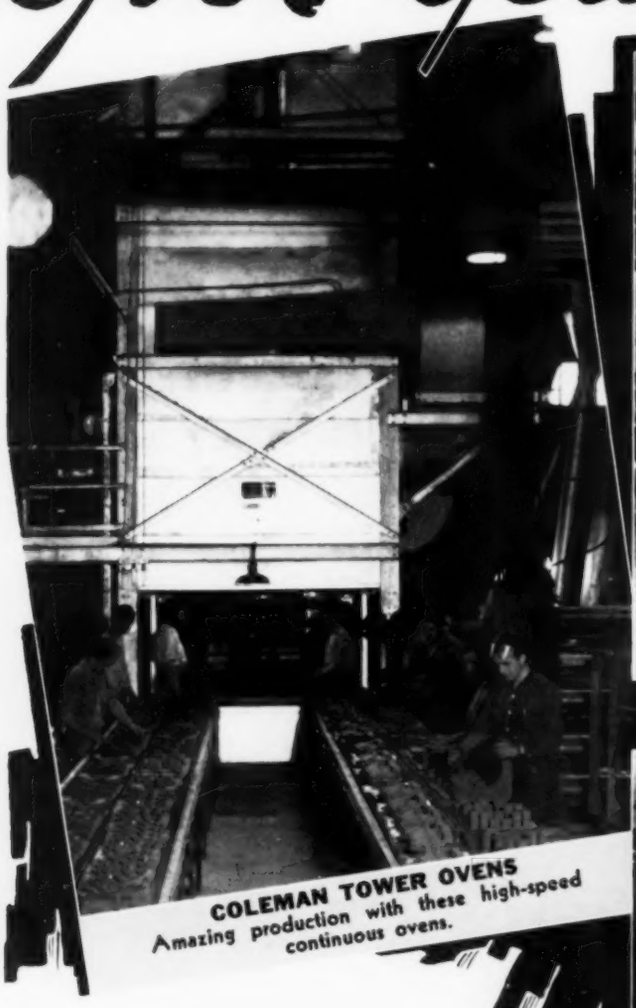
Amecameca Village, with snow-crowned Ixtaccihuatl in the background, is one of Mexico's great market places. Sheltered from the intense sun by large awnings, the native merchants find a ready sale for their ware . . . While *super markets* may be tentatively yours in the casting field during the present emergency, sales shall someday again prove competitive and your product will be subjected to closer inspection . . . Cleaner castings may be yours today, regardless—for Cordip, the ideal wash for dipping or spraying cores of dry or green sand, produces smoother and cleaner castings by "turning" the iron when being cast. Easy to mix—by simply adding water—Cordip, for the entire field of core manufacture, will minimize your cleaning costs.

EWING GALLOWAY PHOTO

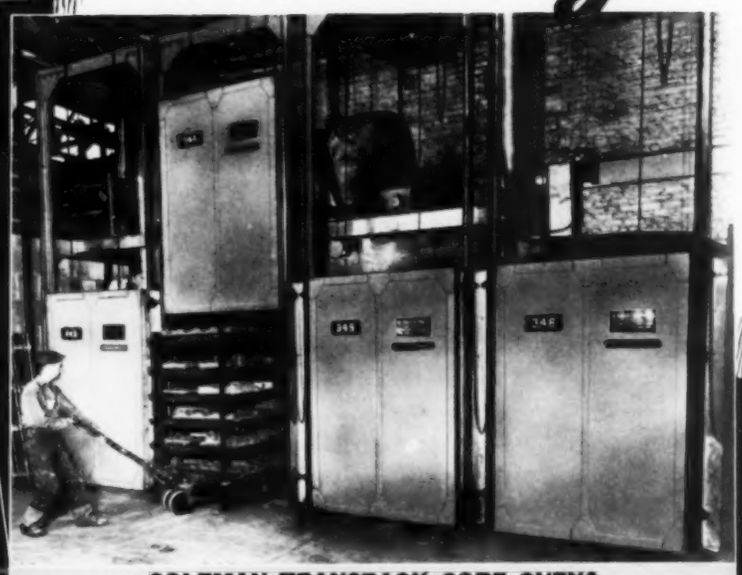
THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

CORDIP

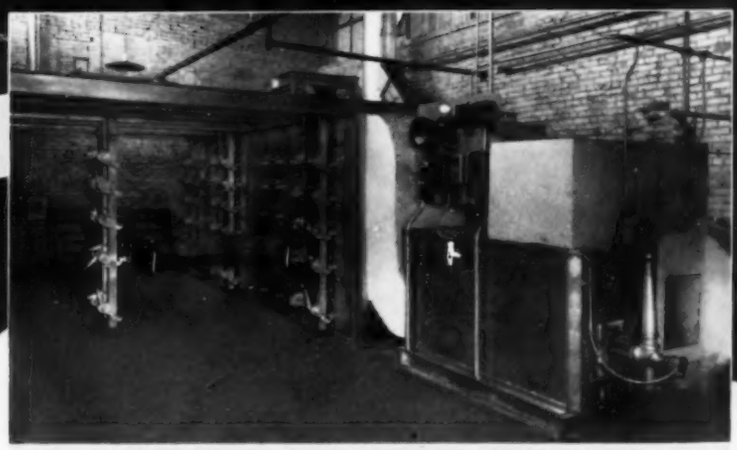
Give Your Castings



COLEMAN TOWER OVENS
Amazing production with these high-speed continuous ovens.



COLEMAN TRANSRACK CORE OVENS
Most popular all-purpose type of core oven.
Wide range of standard sizes.



COLEMAN ROLLING DRAWER CORE OVENS
Wide range of sizes for high speed baking of medium and small cores.

COLEMAN OVENS

Built in the following types and for any fuel that is economically available.

PORTABLE . . . ROLLING DRAWER
TRANSRACK . . . TOWER
CAR . . . HORIZONTAL CONVEYOR

COLEMAN

Built by **THE FOUNDRY**

the Right Start with COLEMAN OVENS

● **Eliminate casting rejects due to improperly baked cores.**

No matter how carefully you select your sands and binders your cores cannot be right unless they are baked right.

For every class of foundry work, light, medium or heavy—from magnesium to cast armor—there is a Coleman Oven type and size to do the job dependably, quickly and economically.

THE FOUNDRY EQUIPMENT CO.
BUILDERS OF COLEMAN AND SWARTWOUT OVENS
CONTRACTING ENGINEERS AND MANUFACTURERS
CLEVELAND, OHIO

COLEMAN CAR TYPE CORE OVENS
For all classes of heavy and medium cores.

Over 36 Years' Experience .. Over 6,000 Installations

CORE and MOLD OVENS

EQUIPMENT CO., Cleveland, O.

DELTA

DELTA RESEARCH LABORATORIES are playing a vital part in the development of scientific, laboratory controlled products for the foundry. Substitutes and new products must be found to replace certain essential materials now difficult to obtain, or cut off entirely... and the DELTA OIL PRODUCTS COMPANY have the facilities and resourcefulness for this important job.

DELTA CORE AND MOLD WASHES

GRAKOAT.. STEELKOAT.. Z-KOAT.. BLACKOAT

All Delta core and mold washes are Dilatometer proven for hot strength to insure positive adherence to core and mold surfaces. They produce high fusion surfaces which are highly refractory and absolutely moisture-proof. In use, these washes remain in suspension, eliminate gas formation, and are non-reactive in contact with molten metals.

Most economical to use . . . cut cleaning room costs . . . produce smoother surfaces and more perfect castings.

DELTA PARTEX-NUT SHELL PARTING

The modern scientific Lycopodium replacement. Absolutely safe and non-hazardous. It is economical . . . costs only a fraction of the cost of Lycopodium. The most efficient parting available . . . insures better core and mold surfaces.

DELTA SPRAY BINDERS

A product of unusual value for green sand molds.
Produces, almost instantaneously, dry mold surfaces, thereby eliminating hours of oven or torch drying. Very easy and most economical to use.

DELTA CORE ROD DIP OIL

Another development of Delta Research Laboratories . . . a product of unusual value to the Foundry Industry. With Delta Core Rod Dip Oil the sand adheres to the rods and wires, increasing the strength of the core and preventing rod and wire migration. Fewer rods and wires are required to retain maximum strength. Economical to use . . . only a small amount of core rod dip oil is required.

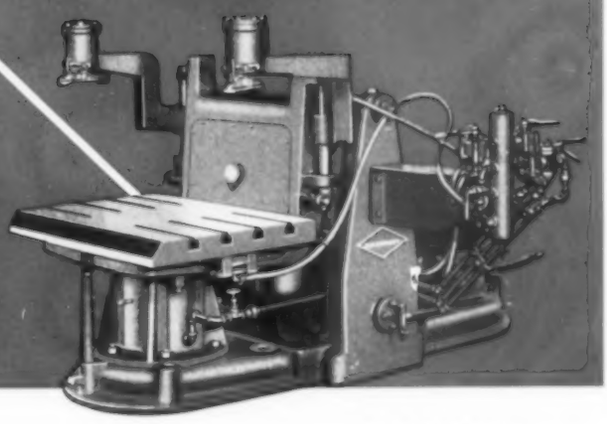
DELTA PRODUCTS FOR THE FOUNDRY

DELTA OIL PRODUCTS CO.

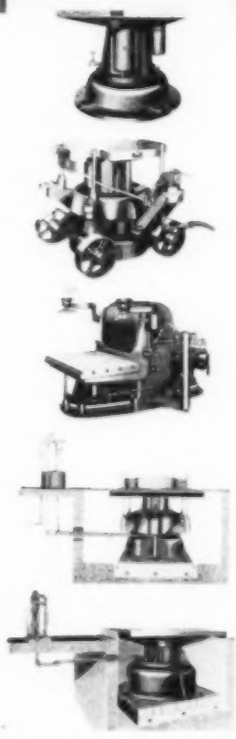
MANUFACTURERS OF INDUSTRIAL AND AUTOMOTIVE OILS, GREASES, AND COMPOUNDS

MILWAUKEE WISCONSIN

SPEED and ACCURACY for FOUNDRY MOLDING



Model 24-SA



HIGH EFFICIENCY

"DAVENPORT"
Line of Molding Machines

★ **JOLT ROLLOVER DRAW MACHINE**
Model SA (Seven sizes)
Capacity from 750 to 12,000 lbs.
Model A (Six sizes)
Capacity from 1,000 to 12,000 lbs.

★ **JOLT STRIPPER OR PUSH-OFF MACHINES WITH ADJUSTABLE LIFT PINS**
Six sizes.
Capacity from 1,000 to 10,000 lbs.

★ **PLAIN JOLT MACHINES**
Fourteen sizes.
Capacity from 200 to 25,000 lbs.

with "DAVENPORT" MOLDING MACHINES

Only MORE will win the WAR and "DAVENPORT" molding machines are giving MORE production.

It will surprise you—the many improvements and refinements that are on the modern "DAVENPORT" molding machines.

They are faster and deliver greater accuracy—they are simple to operate and easy to install. They are built better and will wear longer.

Now is the time to have one of our engineers come to your foundry and check over your present requirements.

Write today. Be sure you are getting MORE which will help win the WAR.

DAVENPORT MACHINE & FOUNDRY CO.

DAVENPORT IOWA, U. S. A.

BOOST PRODUCTION
in Your Cleaning Room
PRODUCTION curves must go up. War work is bringing new jobs—new grinding problems to many foundries. But Norton is ready—with a complete line of wheels to meet all the new grinding jobs in the cleaning room—with abrasive engineers and service men trained to solve the new grinding problems. Let Norton help you keep production climbing.
NORTON COMPANY
Worcester, Mass.
W-871
NORTON ABRASIVES

Vanadium in Cast Steel

Steel castings containing vanadium have a higher elastic ratio than castings without vanadium but of otherwise like composition and heat treatment. At the same time, the vanadium castings possess at least equal ductility in tension and a considerably higher impact strength and wear resistance. Grain size is smaller and more uniform, while grain growth at heat treatment temperatures is retarded.

Other components of composition being alike and the details of steelmaking such as melting and pouring being practically constant, a vanadium steel will exhibit less marked dendritic segregation within the grains. This is recognized as an extremely important factor in the manufacture of many intricate castings where cracking during heating and cooling cycles is eliminated. The effect is to simplify heat treatment and produce more uniformity in final structure; hence — greater ability to sustain stress or to deform rather than rupture under sudden overloads.

Mechanical properties may be obtained by double normalizing and tempering that are not equalled even by more drastic and often dangerous liquid quenching and tempering of many other alloy steels. This is of great importance in large complex castings. In fact, suitable adjustment of composition, combined with single normalizing and tempering or sometimes single normalizing alone, open up new possibilities in the use of high-strength cast steels.

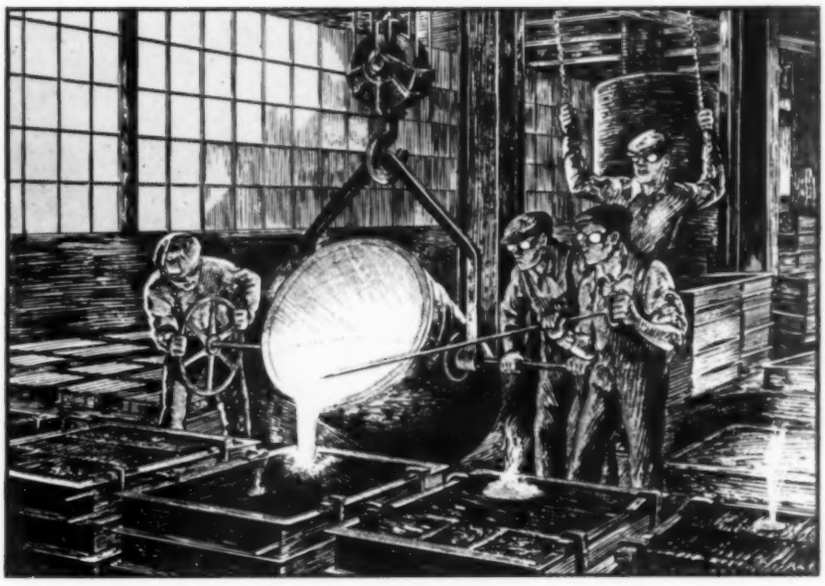
Did You Visit Us at the FOUNDRY SHOW?

Whether or not you attended the recent Cleveland convention, may we take this opportunity to remind you that we are now prepared more than ever to fulfil your grinding wheel requirements. With greatly expanded kiln and oven capacity, new modern presses, increased personnel, BAY STATE offers greater production, quicker delivery, and more accurate grade control of all types of resinoid and vitrified bonded abrasive products.

CUT-OFF WHEELS
CONES
SNAGGING WHEELS
MOUNTED POINTS

Bay State

ABRASIVE PRODUCTS COMPANY
WESTBORO MASSACHUSETTS



CLEARFIELD

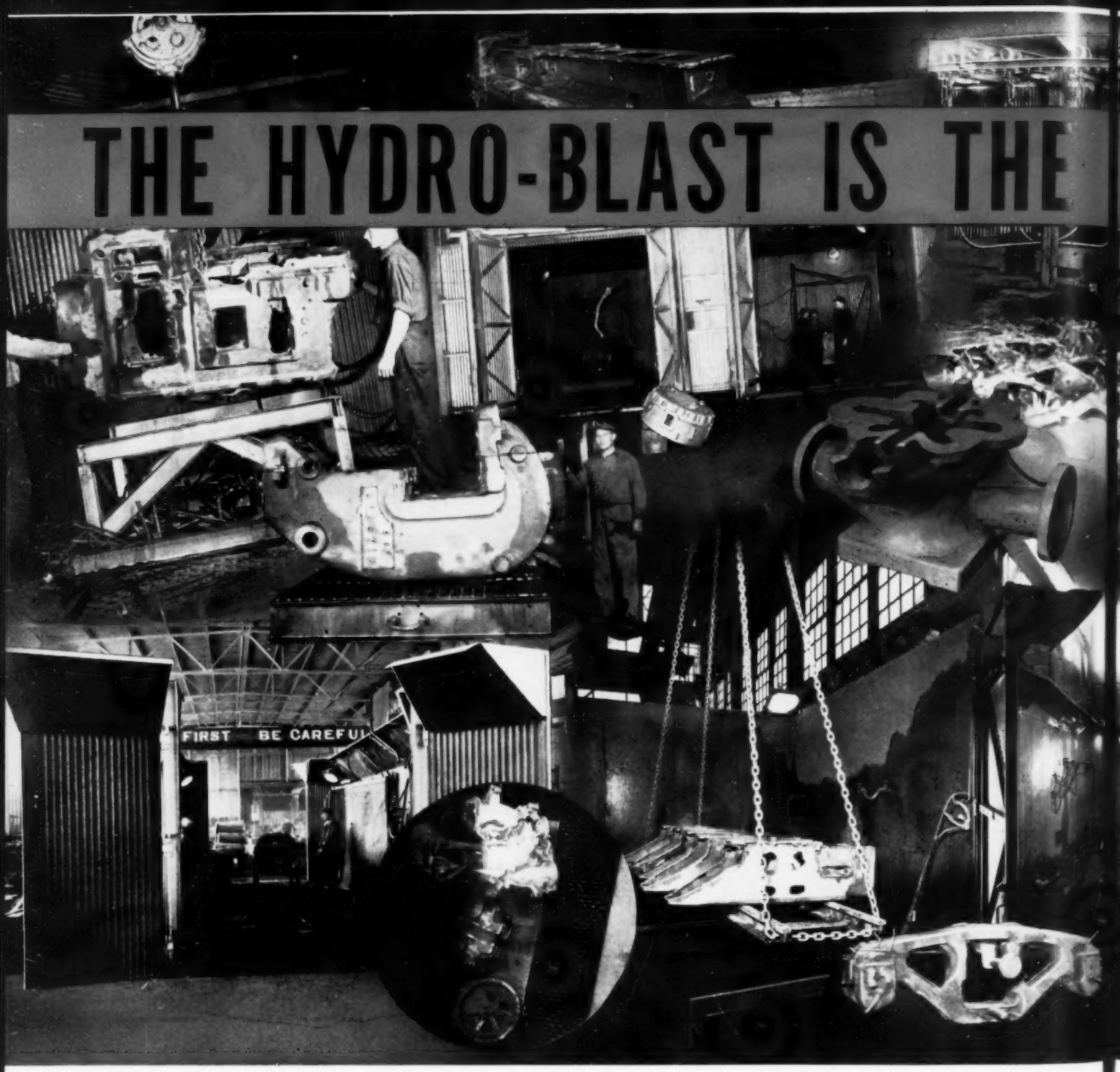
A LINE OF SAND CONDITIONING
MACHINES DESIGNED AND
BUILT BY FOUNDRYMEN
FOR FOUNDRYMEN.

Our Seventy-fifth Anniversary Catalog
is just off the press

MAY WE SEND YOUR COPY?

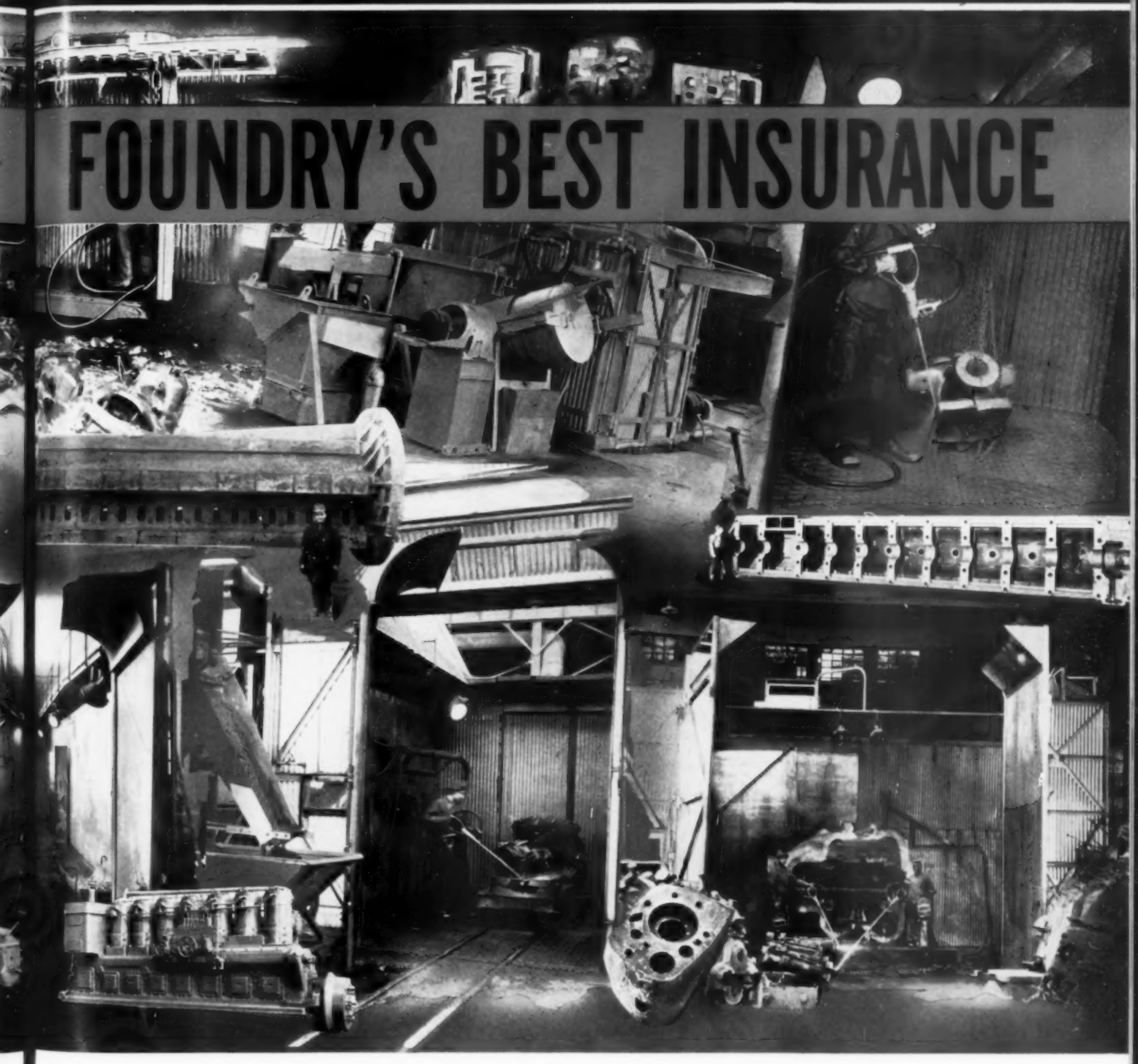
CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.



HYDRO-BLAST RESEARCH = CLEANER CASTINGS + RECOVERY

America's foundries cannot afford production "bottle necks" in the all out effort to bring the war to a successful and early conclusion. Such essential war materials as machine tools, core sand and castings are worth more than their "weight in gold." Hydro-Blast cleans castings cleaner and assures an ample supply of sand completely free of dead bond. Hydro-Blasted castings require less machining because freedom from sand particles greatly lengthens the life of machine tools. No other casting cleaning equipment will bring the same economic and production advantages to your foundry.



FOUNDRY'S BEST INSURANCE

CASTINGS + CLEANER FOUNDRIES + SAND + BETTER SAND + AMPLE SAND SUPPLY

Hydro-Blast is today's "best" method for cleaning castings of any size or weight without creating dust—steel, gray iron, malleable and non-ferrous. It mines out cores and cleans surfaces so that no sand chipping is required. As the sand is removed from the cores, it can be recovered, scrubbed and dried to any desired moisture content, and returned to the system at a fraction of its replacement cost. Hydro-Blast will serve you well today when war demands your greatest production effort. It will serve you profitably tomorrow when business may demand lower production costs.

NEED SKILLED HELP?

TO the man who is long on production problems and short on skilled technical help, we believe we can offer some assistance. For more than 25 years The Carborundum Company has been solving refractory problems for the metal industry. In the course of that time we've come up against pretty nearly every situation the business has to offer.

Our engineers are equipped with this background of experience to be particularly helpful to you today. They can quickly assist you in the proper selection and use of specialized refractories, saving you time and detail work.

Carborundum Brand Refractories include over 65 standard varieties in regular production, plus many special modifications. They are used to construct retorts, muffles, hearths, supports, or complete linings in all types of furnaces, including furnaces for forging, the reduction and refinement of non-ferrous metals, melting of non-ferrous and ferrous metals, reheating, tempering, hardening and carburizing.

If you have a refractory problem, The Carborundum Company's experience is at your disposal. We invite you to write today.

REFRACTORY CARBORUNDUM PRODUCTS

THE CARBORUNDUM COMPANY, REFRACTORY DIVISION, PERTH AMBOY, N. J.

District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fire Clay Company, El Paso, Texas; Smith-Sharpe Company, Minneapolis, Minn.

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

Mr. Foreman
Don't you agree that you should get better castings with FIVE different bonding clays and their many combinations to work with? ONLY ECP offers you this range of products plus SEVEN full-time service engineers to assist you. Call on us without cost or obligation.
EASTERN
CLAY PRODUCTS, INC.
EIFORT, OHIO
ECP
All TYPES OF BONDING CLAYS
A Foundry Sand Service Based Upon Practical Research

WHEELABRATOR CONSERVES

CONSERVES	1	**TIME**—by cleaning faster and speeding up shipment of orders.
CONSERVES	2	**HORSEPOWER** — by eliminating compressed air, the WHEELABRATOR saves power up to 80%.
CONSERVES	3	**CUTTING TOOLS**—by thoroughly removing sand and scale, tools stay sharp longer and require less frequent grinding.
CONSERVES	4	**MANPOWER**—by mechanizing loading and unloading to a high degree, and by greatly simplifying all other operations.
CONSERVES	5	**SPACE**—by reason of its cleaning speed and productive capacity fewer machines are required.
CONSERVES	6	**ABRASIVE**—by using metallic abrasive—one ton of which will do the work of a carload of sand.
CONSERVES	7	**MATERIAL**—by reducing breakage to the minimum an appreciable saving in time and money is effected.
CONSERVES	8	**SUBSEQUENT OPERATIONS**—by removing sand and scale down to the virgin metal the final machining, grinding and inspection operations are handled more rapidly.
CONSERVES	9	**EQUIPMENT**—by reducing piping requirements and by eliminating air compressors, compressor motors, pressure tanks, mixing chambers, air receivers, piping, hose, control valves, and nozzles.
CONSERVES	10	**MONEY**—by saving time and material, as emphasized by the 9 preceding points.

TRADE MARK

THE AMERICAN MOLDER

REG. U. S. PAT. OFF.

WHEELABRATOR *SPEED CLEANING* IS HELPING SPEED THE DAY OF *VICTORY*

IN 10 DIFFERENT WAYS

NEVER has Conservation been so vitally necessary as it is now, when our entire national economy is directed toward one end—the accomplishment of complete Victory.

In the cleaning and finishing of war materials the subject of Conservation has taken on a new meaning, because the airless WHEELABRATOR has injected into it a new concept of economy by reason of the Time—Power—Equipment—Materials—Labor—and Space it saves. Read the preceding page for information on how this has been made possible.

Read the Wheelabrator Digest for Latest Tips on Metal Cleaning Practice

To keep in tune with the latest developments in metal cleaning we recommend that you read the "Wheelabrator Digest" a bi-monthly publication crammed full of shop kinks and ideas that will help speed up production and reduce costs in your cleaning room. We will be glad to add your name to our mailing list.

DO YOU KNOW THAT--

When the 20" x 27" WHEELABRATOR Tumblast was installed at Cushman Chuck Co., Hartford, Conn., for cleaning scale from heat treated lathe-chuck parts the machine cleaned the same amount of work in the first three hours of its operation that had previously required three days to handle in their old air blast cabinet.

★

Before installing a WHEELABRATOR, one concern employed twenty girls to file flashes and fins from die castings. They are now obtaining an excellent finish without this added expense and the slight roughening provides a better japanning job.

★

Small brass castings weighing 200 to 750 lbs. per load are cleaned in 3 to 5 mins. in a 27" x 36" WHEELABRATOR Tumblast at National Bronze Co., E. Springfield, Mass.

★

WHEELABRATING scours out every trace of sand, scale, rust and dirt from the smallest fissure and hair line crack.

AMERICAN
FOUNDRY EQUIPMENT CO.

HE CAN SHOW YOU

HOW to Step Up Production

He's the Republic Pig Iron Metallurgist. He knows irons and foundry practice from both technical and practical standpoints.

He knows the characteristics of the various grades of irons—how they perform in cupola, ladle and flask—and the qualities each produces in finished castings.

He knows foundry operations—from long practical experience in foundries of every type. He is well qualified to study methods and equipment and make suggestions on how to step up production. He knows what causes troubles in castings and how to remedy them when they arise.

He's just the man you need *now*—when every foundry's utmost capacity is needed for *Wartime Production.* And he's ready to roll up his sleeves and tackle the problems in your plant.

When would you like him to call?

REPUBLIC STEEL CORPORATION

General Offices: Cleveland, Ohio

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

REPUBLIC STEEL — PRODUCTION FOR VICTORY

Republic

PIG IRON

"CHATEAUGAY"
Low-Phosphorus Copper-Free

"REPUBLIC"
(Northern)
Foundry, Basic and Malleable

"PIONEER"
(Southern)
Foundry and Basic

ALSO TRUSCON FOUNDRY FLASKS · REPUBLIC CORE WIRE · FOUNDRY NAILS

Closer Co-operation Needed Between WPB and Nonferrous Foundries

ONCE again the foundry industry in general, and this time the brass, and bronze branch in particular, is suffering from lack of aggressive leadership in Washington. Blame for this situation rests with both government and the brass and bronze foundries. For instead of close co-operation between war agencies and nonferrous foundries, there has developed a lack of mutual understanding accompanied by loose talk and crackdown orders that cannot help but hamper production in many plants making mighty important products for war.

The real pay-off came recently when Harry O. King, chief, Copper Branch, WPB, is reported to have told producers of brass and bronze ingot that an investigation shows "90 per cent of all foundries have violated every priority regulation issued," and that "the abuses by foundries have been terrible." While it is to be presumed that Mr. King is speaking only of those foundries melting copper alloys, his statement constitutes a serious indictment against the entire foundry industry, even though no definite proofs have been submitted.

Mr. King is reported to have stated further that he attributes these violations to lack of information and failure of foundries to keep up with war regulations. Perhaps he does not realize the difficulties which the average small plant must overcome in keeping up with the orders of the WPB and other agencies. Just as an example, of the first 150 orders issued by OPM, predecessor of WPB, 85 affected foundries in some degree. Undoubtedly, much of the violation proclaimed by Mr. King is of the unintentional or technical variety and is bound to happen if the company management attempts to anticipate demands which war agencies are likely to make at any time. Most of the orders from the old OPM and the present WPB were prepared by members of the legal staff who have little understanding of the problems of industry and seem more concerned with the complete legality of the terms of the order than with production of materials for war.

If, as the WPB insists, there have been extensive violations among brass and bronze foundries, the Copper Branch must assume a fair portion of the blame for inept handling of its relationships with the nonferrous branch of the foundry industry. In the early days of the national defense effort it seemed apparent to some that closer contact between government agencies and the nonferrous industry was necessary if production of castings for defense work was to reach its maximum efficiency. An exceedingly representative meeting of nonferrous foundrymen was held in New York in May, 1941 during the annual convention of the A.F.A., and a committee was appointed to visit Washington to offer its services and the help of those in attendance in New York in meeting the problems which seemed inevitable as the government assumed greater control over production. For some reason, those then in charge of the Copper Branch were unable to see the committee from this important section of the nonferrous industry. The group finally were directed to a member of the legal profession attached to that branch, and were informed quite emphatically that the services of such a committee were not necessary. More recently, attention has been directed toward the need for the establishment of a nonferrous foundry unit with the Copper Branch, and to date this effort has not been successful.

But brass and bronze foundries now have WPB order M-9-b, one of the most drastic orders to be directed at any industry. Effective the middle of May, all foundries were required to secure individual permission from the Copper Branch, WPB, Washington, to melt any ingot brass or bronze on hand, regardless of preference rating by which the metal was secured. No foundry now may receive any ingot from any ingot maker or person unless the foundry has asked and received specific authorization from WPB to receive shipment.

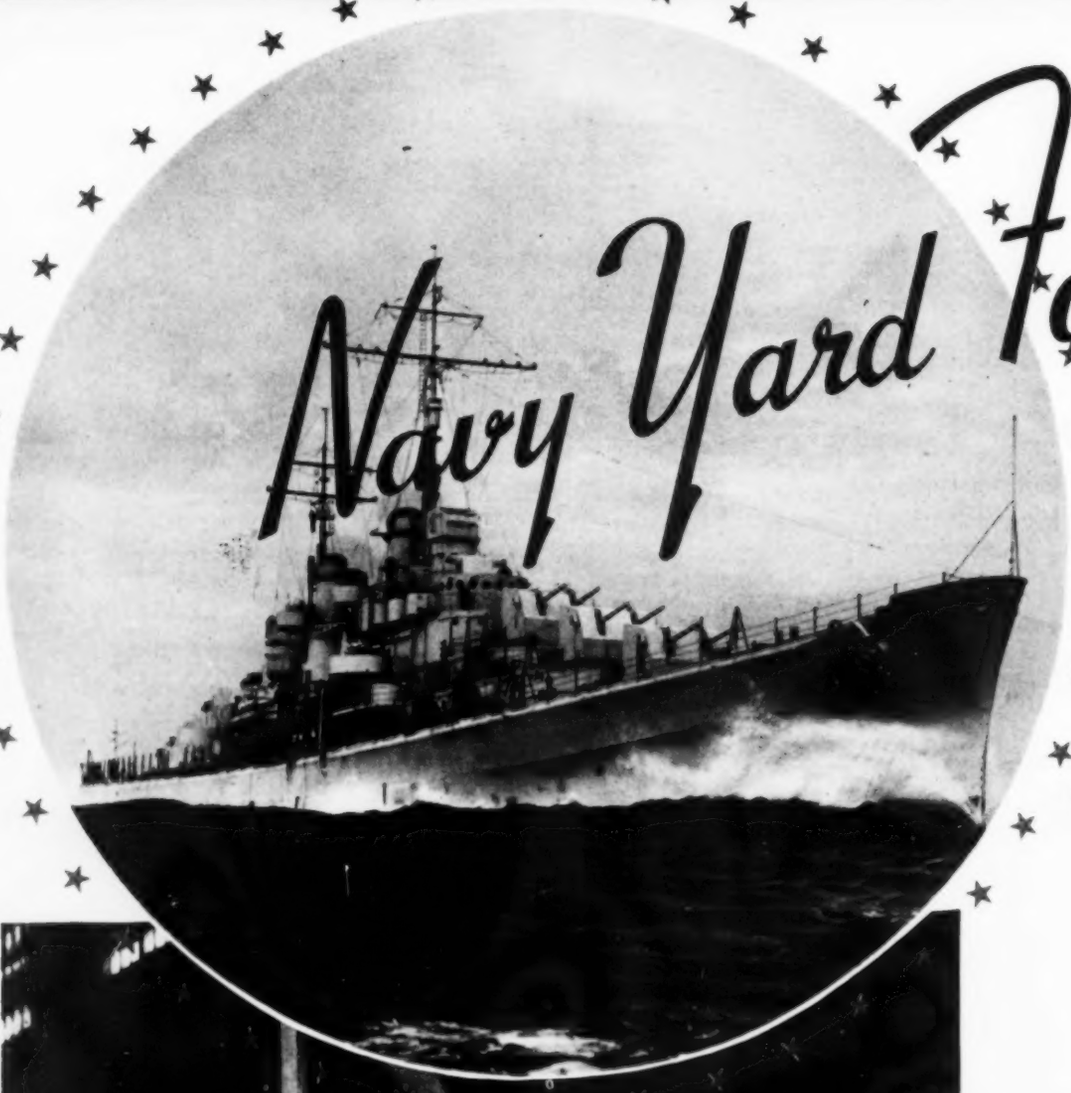
For the good of the war effort, it is high time that a representative group of brass and bronze foundrymen and the officials of the Copper Branch get together in attempt to solve the present problems.

Frank G. Steinebach

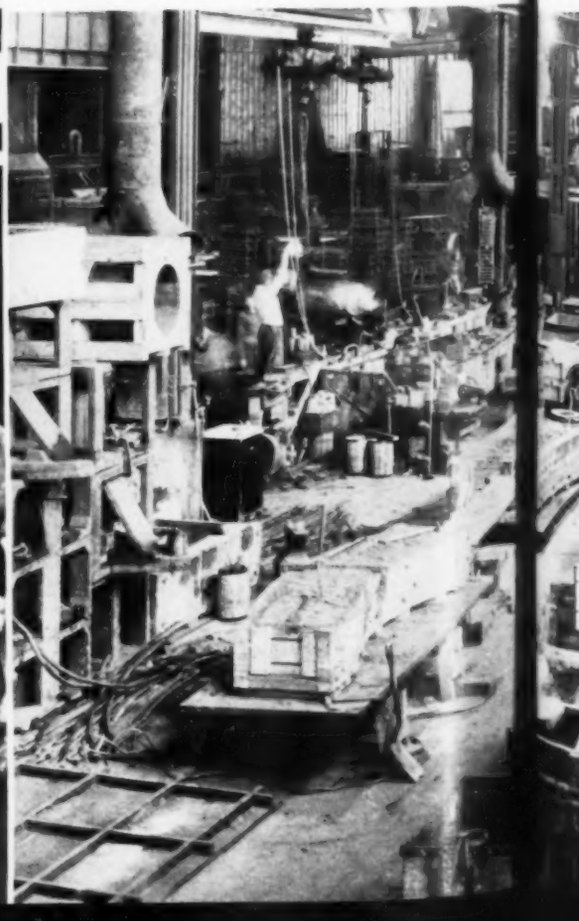
Editor

Navy Yard Foundry

★DEVELOPS ★ CASTING ★ TECHNIQUE



By PAT DWYER



IN ADDITION to buying a great volume of castings from outside commercial interests, the United States Navy Department operates large gray iron, steel and nonferrous foundries as part of the various navy yard establishments located at strategic points on the Atlantic and Pacific sea coasts. Adherence to rigid specifications and highest standards of material and workmanship essential to acceptance of castings from outside foundries, if possible is more closely demanded in foundries operated and controlled by the Navy Department.

Under normal conditions the navy yard foundries essentially are jobbing shops where long running production jobs are the exception and not the rule. Under present abnormal conditions in many instances the naval foundries carry on a considerable amount of experimental work. Preliminary work on a new type casting, including design, pattern construction, molding, coremaking, heading and gating is carried on until a satisfactory technique is established, and all the bugs have been eliminated. Orders for duplicate castings then are placed with outside foundries with advice, instructions and in some instances with case histories detailing development of the approved and satisfactory technique.

Rigidity and strictness of navy specifications are based on the fact that a naval vessel is a closely integrated unit, built primarily as a combatant, exposed to close, hard service and exposed to violent shock and hazard in addition to the usual wind, sea and weather incident to the life of all ocean going craft whether in the naval or merchant marine. Failure of a single casting conceivably might imperil the safety of the ship and the lives of the personnel. The claim has been advanced—and it seems a reasonable claim—that the navy insistence on practically absolute perfection has spurred foundrymen to the production of castings considered in earlier years as outside the scope of practical accomplishment.

Practically every foundryman knows either through personal experience, hearsay or other report, that remarkable castings have been produced on occasion under highly unsatisfactory conditions and with primitive equipment. These castings constitute a striking tribute to the ingenuity, skill and resourcefulness of master craftsmen. Foundrymen also know that production of plain castings is expedited, and the hazard of difficult castings is reduced to a remarkable degree where buildings, equipment and personnel conform to high class modern standards.

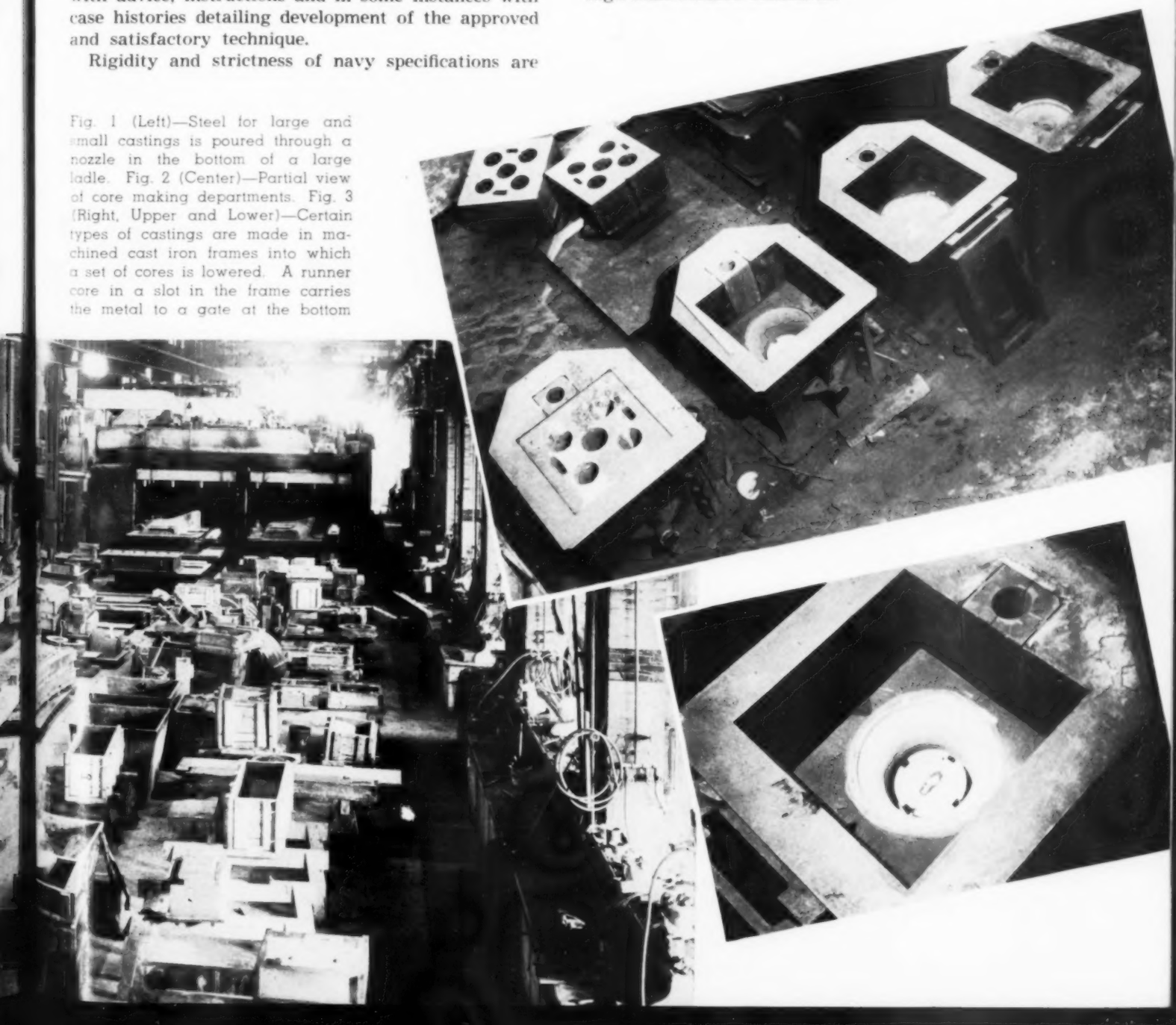
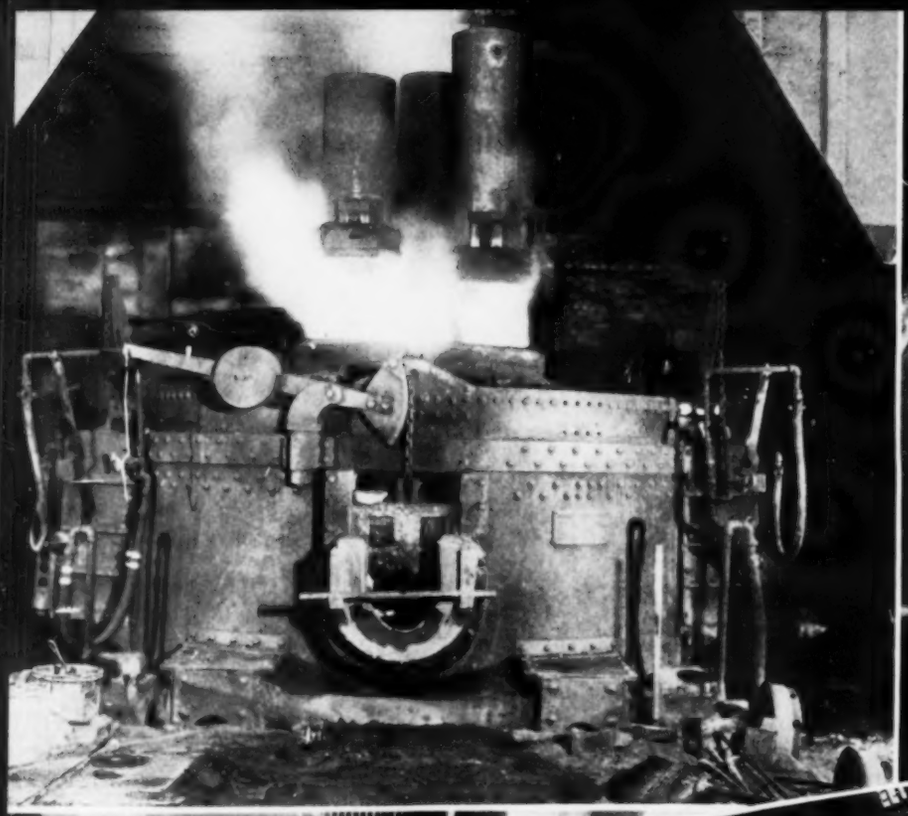
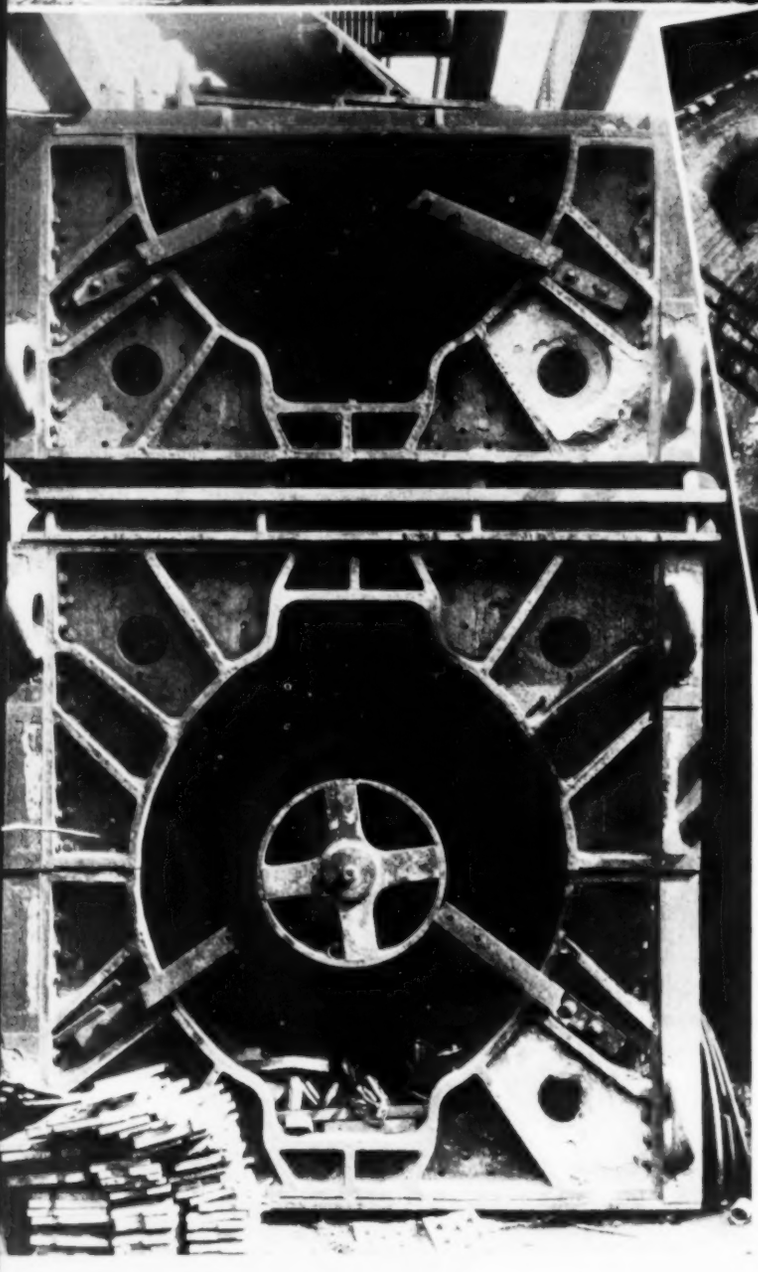


Fig. 1 (Left)—Steel for large and small castings is poured through a nozzle in the bottom of a large ladle. Fig. 2 (Center)—Partial view of core making departments. Fig. 3 (Right, Upper and Lower)—Certain types of castings are made in machined cast iron frames into which a set of cores is lowered. A runner core in a slot in the frame carries the metal to a gate at the bottom





Several of the accompanying illustrations show items of interest in a navy yard foundry. Owing to war time restrictions the location is not available for publication. So far as the reader is concerned that factor is of secondary or even minor importance.

The steel frame, brick wall building 112 x 600 feet houses the steel foundry and the iron foundry. The steel foundry is the predominating partner occupying the entire center bay, one side bay and part of the third bay. Iron castings are made in the remaining part of the third bay where metal is melted in a cupola lined to 36 inches. Two additional cupolas one lined to 48 inches and the other to 65 inches at one side near the center of the main bay are available when demand exceeds capacity of the small cupola, or when large iron castings are molded in the steel section. The cupolas were installed originally to supply metal for a converter, long since discarded for a 50-ton acid lined open hearth furnace and a 6-ton basic electric furnace. By overloading these

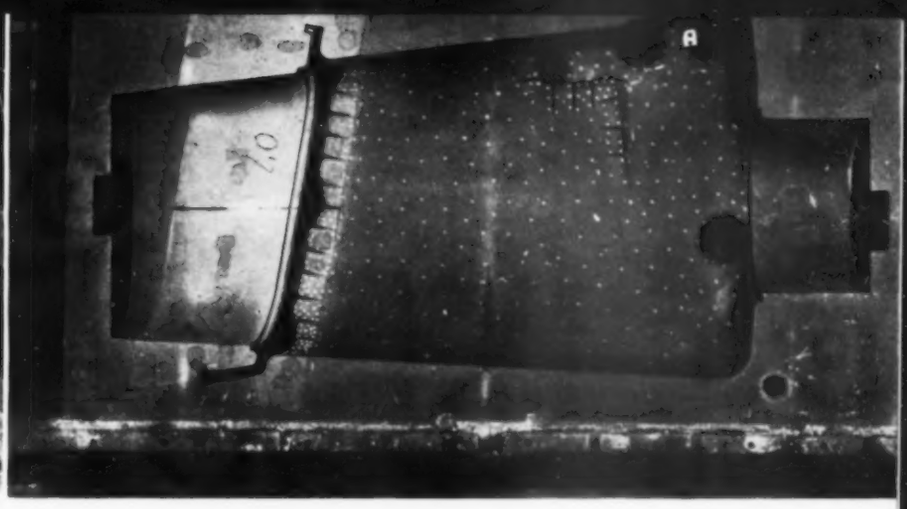


Fig. 4 (Top opposite page)—Alloy and special steels are melted in a 6-ton electric furnace. Figs. 5 and 6—End view of special steel flask and arbor for molding and casting 65-ton cylinder on end. Figs. 7 and 9 (Top center)—Drag open and cored for housing casting. Fig. 8 (Center opposite page)—Miscellaneous castings are heat treated in a 25-foot diameter furnace. Fig. 10 (Above)—Cope for the mold at the left

furnaces occasionally after the manner of all steel foundries, individual steel castings up to 65 tons in weight have been poured. Obviously the process involved some ingenious crane and ladle juggling.

General layout of the foundry includes three main bays extending the full length of the building and divided from each other by the steel columns spaced on 20-foot centers which support the unusually high crane runways and the high roof. Each side bay is 30 feet wide, while the main or center bay is 52 feet in width and spanned by one 100-ton crane, one of 50 tons and 3 of 25 tons capacity. The west bay is served by a 10-ton crane and the east bay has one 5-ton and three 10-ton cranes.

General Layout Features

The foundry is laid out and operated to promote flow of material from the south to the north end. Sand is prepared at the south end. Cores are made in part of the east bay. Steel molds are made, dried, set up and poured in the main bay and the castings are cleaned, annealed and heat treated at the north end of all three bays.

Considering the bays individually for a clearer presentation and commencing at the north end, the west bay has in succession eight rectangular annealing furnaces 5 x 10 feet and two large circular annealing furnaces 25 feet diameter. All furnaces are fired with oil and are provided with removable covers. The base rings for the large circular furnaces are one piece steel castings, made in the shop and as remarkable examples of high class steel castings, as any of the largest and most difficult castings made for shipment.

The next item in the west bay is the 50-ton acid lined, oil fired open hearth furnace with high charging floor at the back and with tapping spout projecting into the main bay. The furnace is charged by hand from material lifted by a crane in the stock yard and loaded into buggies on an outdoor extension to the charging floor. A mezzanine gangway extends from the charging floor to the laboratory where close check is kept on the progress of every heat from the open hearth furnace, also from the 6-ton basic electric furnace located a short distance south of the open hearth. Electrodes for the electric furnace are bought by the carload and stacked in vertical position in a special type rack near the furnace. Thus the available supply always is in evidence. With the known rate of depletion, supplies may be ordered intelligently to avoid either delays or over stocking. A wide range of alloy additions for the charge is kept on hand in conveniently situated bins.

Complying with wartime blackout regulations, a rolling curtain is mounted between two columns in front of the electric furnace. Under normal conditions the curtain is elevated out of the way. If and when necessary the curtain may be lowered to effectually screen flames while the furnace is in operation, particularly during the tapping period when the metal is flowing into the ladle. A commodious foundry office occupies space in the center of the west bay. Remainder of the space in this bay is devoted to the production of gray iron castings.

Sand is prepared in the south end of the main bay and represents one of the most interesting features in the general operation of the foundry. Elaborate equipment cleans the castings with a stream of water and sand at high pressure. The reclaimed sand is used for backing sand and for facing on the great majority of the castings. It is claimed the cost of sand delivered to the foundry has been reduced to one tenth of the average cost under former conditions. A more detailed description of the installation and method of operation will be presented in a later article.

Facing sand, core sand, mold and core wash are prepared according to the following formulas: Dry sand molds for heavy castings—550 quarts molding sand, A.F.A. grade 5-D; (*Please turn to page* 159)

Economical Alloying of Gray Cast Iron

By R. G. McELWEE
and
T. E. BARLOW
Vanadium Corp. of America, Detroit

ECONOMY is always of vital importance to the gray iron industry—in spite of the fact that we may now hear the expression, "cost is no object—we want results". The fact is that we are now concerned with a different phase of economy, and this is more important than ever. We must learn to think in terms of *materials* economy in addition to *cost* economy.

Fortunately, in the case of alloying elements, *materials* saving is also good *cost* economy. But even so, it may be necessary for many foundrymen partially to revamp their theory of operations to conserve vital commodities; at least it may be necessary to change their approach to many problems. For example, in normal times, adding some alloying element to gray iron merely to insure a specified strength may be more convenient than making a slight change in the base iron. Or again, it may be easier, and perhaps even cheaper, to offset an error in practice by the use of alloying elements than by elimination of the basic difficulty. This has never been good alloy practice from a metallurgical viewpoint, but under some conditions it may be sound economy.

Now, however, the situation has changed. Conservation of material is of prime importance. The alloying elements usually so convenient may not be available; or if available may be vital to the Nation's Defense. Therefore, the foundryman must depend upon his knowledge of good practice to offset a lack of a specific material. We must now practice the proper and judicious use of alloys *to the greatest possible advantage*. This has always been good practice; now it is imperative.

In many cases, unfortunately, the individual foundryman has no control over the type and quantity of the alloying elements he uses, because of chemical specifications set up by his customer. However, he

can use the *minimum* amount specified in such a manner as to get the greatest benefit from it instead of using the maximum allowed, which so often is done as a convenient safety factor. He may also be able to have the specification corrected if he can prove that an economy of material would result without a loss in quality. The procedure for this is rather difficult, but it can be done in many cases.

Necessity for avoiding waste of alloying elements is not restricted to those cases for which materials are not readily available. The mere fact that a given casting is vital to the war effort and carries a high priority rating, does not justify waste of material through inefficient use or careless practice. For the present at least, it is impossible for any govern-

Upper left, mixing ladle and equipment for adding alloys. Left, large gray iron pistons, illustration courtesy Gisholt Machine Co., Madison, Wis. Above, assembly floor for machine tools, illustration courtesy Gleason Works Inc., Rochester, N. Y.

mental agency to do more than stipulate which castings are vital and which are to be released for that purpose. The allocation by such organizations is based on the inventory of the individual foundry and the need for the casting in question. Therefore, it is the patriotic duty of the foundryman himself to see that vital commodities are used to the greatest possible advantage in his plant, assuming, of course, his co-operation in handling specifications and priorities.

Obviously, the first step in the proper utilization of alloying materials, is to know the effects of the individual elements and combinations of these elements. This information, together with recommended practice for minimizing loss due to oxidation and poor distribution in the metal, is available in the literature. Some of this information may be as yet unpublished, but the alloy manufacturers all maintain technical staffs to disseminate such information upon request.

The object here is to discuss the basic factors contributing to economical use of alloying elements, namely the methods of ensuring that alloying material is added only to the most suitable base irons. The principles involved have always been essential to the most logical alloying practice. However, as mentioned previously, the best theoretical practice has not always been economical—now it is essential.

The most obvious method of economizing on the use of alloying elements is to adjust the base iron composition to produce as closely as possible, the desired structure. Such adjustment minimizes the necessity for alloying treatment and permits a greater efficiency. This may sound elementary, but it is really a rather difficult problem and one which apparently is not well considered in some specifications. In the first place such practice requires a thorough knowledge of the effects of the individual alloying elements to ensure that the adjustment in the base iron is in the right direction. In the second place, in the absence of alloying elements, structure can be controlled by base analysis for only one given section or cooling rate. It is therefore imperative to know which section of the casting is the most important, or the controlling section. In the third place, the base iron analyses are determined to a great extent by the melting unit, particularly from the standpoint of versatility. (*Please turn to page* 141)

FOUNDRY ORDERS should carry COMPLETE INFORMATION

1

ESTIMATE

Customer The Blank Tool Company
Address 1264 Factory Street,
Pattern Number A 648 Part Number 165 Drawing Number 1374
Description of Casting
Gear Housing
100 Castings - weigh each 500# Total 50,000#
MELTING - WEIGHT - Each Mold 700# Total 70,000#
CORES — Pieces | Description | Time | Rate | COST
MOLDING - Floor Time Rate → Molder | Helper | Total
CLEANING | Weight | Time | Rate | COST
Barrel
Grind
Chip
Brush
Sand Blast Table

CUSTOMER'S ORDER

2

DATE ORDERED 3/10/42
MOLDS Made
Scrapped
Net
In mold 700 #
Remelt #
Good 500 #Each
ORDER - Customer's 9675 Production 4760 PAT. NO. A 648
Customer's Name The Blank Tool Company
Description of Casting
Gear Housing
Their part no. 165
Their drawing no. 1374
SCHEDULED

	Start	Finish
Cores	3/16/42	3/18/42
Molds	3/19/42	3/23/42
Clean	3/24/42	3/24/42
Ship		3/25/42

CASTINGS Ordered 100 Made
COST

Date	Wt. Melted	Wt. Good	Prod. Order	Operation	Metal	Labor	Burden
			4760	SHAKE OUT			

3

CUSTOMER - Name The Blank Tool Company Order No. 9675 Pattern No. A 648
MOLDS Made
Scrapped
Net
In Mold
Remelt
GOOD CASTINGS 500 # each #Total
DESCRIPTION OF CASTING
100 Gear Housings
Their part no. 165
Their drawing no. 1374
DATE Ordered 3/10/42
Cast
ORDER NO. 4760
SCHEDULED

	Start	Finish
Cores	3/16/42	3/18/42
Molds	3/19/42	3/23/42
Clean	3/24/42	3/24/42
Ship		3/25/42

Wt. Melted | Wt. Good | Metal | Labor | Burden

DATE	WEIGHT MELTED	ORD NO	PCS	WEIGHT GOOD	METAL	LAB	BUR
0000	00000	0000	0000	00000	000 00	00 00	00 00
1111	11111	1111	1111	11111	111 11	11 11	11 11
2222	22222	2222	2222	22222	222 22	22 22	22 22
3333	33333	3333	3333	33333	333 33	33 33	33 33
4444	44444	4444	4444	44444	444 44	44 44	44 44
5555	55555	5555	5555	55555	555 55	55 55	55 55
6666	66666	6666	6666	66666	666 66	66 66	66 66
7777	77777	7777	7777	77777	777 77	77 77	77 77
8888	88888	8888	8888	88888	888 88	88 88	88 88
9999	99999	9999	9999	99999	999 99	99 99	99 99

An ORDER is the authority for performance. Verbal orders leave too many opportunities for: (a) Honest misunderstandings of details which lead to bad performance. (b) Alibis for bad performances arising from alleged misunderstandings.

Therefore, written orders although more trouble and expense, are usually economical in the end. To illustrate the procedure to follow the author presents a plan for preparing orders for producing rough castings of various shapes and sizes in a gray iron foundry. The general principle of this plan is equally adaptable to steel, malleable and nonferrous foundries.

The jobbing gray iron foundry, for which this particular plan is intended is divided into four classes of work, usually designated as departments: (1) Melting. (2) Core Making. (3) Molding. (4) Cleaning.

First consideration in the design of each form is to insure uniform data for the guidance of each company employe concerned with producing and shipping each separate kind of casting. The next consideration being to inform the customer that the order duly has been accepted and scheduled for production and shipment. Further consideration in the design of the forms is given to provision for collecting and recording cost data for material used, labor expended on the several operations and burden charges inci-

4

MANUAL METHOD

CLOCK | TIME PIECES
ORDER - Customer's 9675 Production 4760 PAT. NO. A 648
Customer's Name The Blank Tool Company
DESCRIPTION OF CASTING
Gear Housing
Their part no. 165
Their drawing no. 1374
SCHEDULED

	Start	Finish
Cores	3/16/42	3/18/42
Molds	3/19/42	3/23/42
Clean	3/20/42	3/24/42
Ship		3/25/42

CASTINGS Ordered 100 Made
COST

Prod. Order	Operation	Labor	Burden
4760			

CORE MAKING | MOLDING | GRINDING | CHIPPING | TABLE SAND BLAST

5

PUNCHED CARD METHOD

CUSTOMER - Name The Blank Tool Company Order No. 9675 Pattern No. A 648
DATE
EMPLOYEE
OPERATION
TIME
(out)
(in)
PIECES DONE
Total
DESCRIPTION OF CASTING
100 Gear Housings
Their part no. 165
Their drawing no. 1374
DATE Ordered 3/10/42
ORDER NO. 4760
SCHEDULED

	Start	Finish
Cores	3/16/42	3/18/42
Molds	3/19/42	3/23/42
Clean	3/20/42	3/24/42
Ship		3/25/42

Labor | Burden

DATE	EMP	C	ORD	PCS	TIME	LAB	BUR
0000	000	00	0000	0000	00 0	00 00	00 00
1111	111	11	1111	1111	11 1	11 11	11 11
2222	222	22	2222	2222	22 2	22 22	22 22
3333	333	33	3333	3333	33 3	33 33	33 33
4444	444	44	4444	4444	44 4	44 44	44 44
5555	555	55	5555	5555	55 5	55 55	55 55
6666	666	66	6666	6666	66 6	66 66	66 66
7777	777	77	7777	7777	77 7	77 77	77 77
8888	888	88	8888	8888	88 8	88 88	88 88
9999	999	99	9999	9999	99 9	99 99	99 99

CORE MAKING | MOLDING | GRINDING | CHIPPING | TABLE SAND BLAST

By ALBERT E. GROVER
Cost Consultant
Berea, O.

dent to those particular operations.

As bases to show data which can be included on some of the forms, the following information is presented:

The *Shake Out* card shown in Fig. 2 is used:

(1) To record the number of molds made, as a basis for calculating the amount of iron or other molten metal required. This is accomplished by multiplying the number of molds made by the weight in each mold, entering the result in the *Weight Melted* space at the bottom of the card. Arranging the cards, for all jobs to be poured, on the peg board so that the weight melted amounts are visible makes it easy to add the several amounts to obtain the total molten metal required for all jobs.

(2) To record the number of good and scrapped castings produced. This being done when the castings are removed from the sand by the shake out men.

(3) To record the weight of good castings produced. This weight, either calculated or actually weighed, being entered as *Weight Good* at the bottom of the card. These entries being made on the bottom of the cards allow capping the several cards so that the amounts are visible for easy addition.

(4) As a medium for recording the job cost of metal, melting labor and melting department burden (overhead). Note: These amounts are entered on the bottoms of the cards to allow for peg board procedure. (*Please turn to page* 118)

Fig. 1—Top section of estimate sheet which provides means for recording accurate and predetermined cost data. Fig. 2—Shakeout card forms record of number of molds made, number of good and bad castings, weight of good castings, and job cost of metal, melting labor, and melting department burden. Fig. 3—Punched type card for same purpose as in Fig. 2. Fig. 4—Regular operation card is used to record time and pieces made and job cost of labor and departmental burden. Fig. 5—Punched type card for regular operation data. Fig. 6—Tumble card forms record of weight of castings tumbled, and also of job cost of labor and departmental burden. Fig. 7—Punched type card for similar information as contained on Fig. 6. Fig. 8—Shipped card contains record of pieces and weight of castings shipped, and of labor cost and burden covering activities in sorting, crating and handling castings preparatory to delivery to common carriers

MANUAL METHOD

ORDER - Customer's 9675 Production 4760 PAT.NO. A648
Customer's Name The Blank Tool Company

DESCRIPTION OF CASTING	SCHEDULED	Start	Finish
Gear Housing	Cores	5/4/42	5/18/42
Their part no. 165	Molds	5/19/42	5/23/42
Their drawing no. 1374	Clean	5/20/42	5/24/42
	Ship		5/25/42

CASTINGS Ordered 100 Made

Date	Wt. Good	Prod. Order	Operation	COST Labor	Burden
		4760	TUMBLE		

6

7 PUNCHED CARD METHOD

CUSTOMER - Name The Blank Tool Company Order No. 9675 Pattern No. A 648

DATE	DESCRIPTION OF CASTING	DATE	OP	ORD	PCS	WEIGHT	LAB	BUR
	100 Gear Housings	0000	00	0000	0000	00000	00 00	00 00
	Their part no. 165	1111	11	1111	1111	11111	11 11	11 11
OPERATION	Their drawing no. 1374	2222	22	2222	2222	22222	22 22	22 22
Tumble	DATE Ordered 5/10/42 / SCHEDULED	3333	33	3333	3333	33333	33 33	33 33
	ORDER NO. 4760	4444	44	4444	4444	44444	44 44	44 44
	GOOD CASTING # Each-Tumbled	5555	55	5555	5555	55555	55 55	55 55
	Wt. Good	6666	66	6666	6666	66666	66 66	66 66
		7777	77	7777	7777	77777	77 77	77 77
		8888	88	8888	8888	88888	88 88	88 88
		9999	99	9999	9999	99999	99 99	99 99

	Start	Finish
Cores	5/4/42	5/18/42
Molds	5/19/42	5/23/42
Clean	5/20/42	5/24/42
Ship		5/25/42

Labor Burden

8 MANUAL METHOD

ORDER - Customer's 9675 Production 4760 PAT NO. A 648
Customer's Name The Blank Tool Company

DESCRIPTION OF CASTING	SCHEDULED	Start	Finish
Gear Housing	Cores	5/4/42	5/18/42
Their part no. 165	Molds	5/19/42	5/23/42
Their drawing no. 1374	Clean	5/20/42	5/24/42
	Ship		5/25/42

CASTINGS Ordered 100 Shipped

Date	Wt. Good	Prod. Order	Operation	COST Labor	Burden
			SHIPPED		

9 PUNCHED CARD METHOD

CUSTOMER - Name The Blank Tool Company Order No. 9675 Pattern No. A 648

DATE	DESCRIPTION OF CASTING	DATE	OP	ORD	PCS	WEIGHT	LAB	BUR
	100 Gear Housings	0000	00	0000	0000	00000	00 00	00 00
	Their part no. 165	1111	11	1111	1111	11111	11 11	11 11
	Their drawing no. 1374	2222	22	2222	2222	22222	22 22	22 22
OPERATION	DATE Ordered 5/10/42 / SCHEDULED	3333	33	3333	3333	33333	33 33	33 33
Ship	ORDER NO. 4760	4444	44	4444	4444	44444	44 44	44 44
	Castings Shipped	5555	55	5555	5555	55555	55 55	55 55
	Wt. Ship.	6666	66	6666	6666	66666	66 66	66 66
		7777	77	7777	7777	77777	77 77	77 77
		8888	88	8888	8888	88888	88 88	88 88
		9999	99	9999	9999	99999	99 99	99 99

	Start	Finish
Cores	5/4/42	5/18/42
Molds	5/19/42	5/23/42
Clean	5/20/42	5/24/42
Ship		5/25/42

Labor Burden

10 MANUAL METHOD

ACKNOWLEDGMENT
Date 3/12/42

ORDER - Customer's 9675 Production 4760 PAT.NO. A648
Customer's Name The Blank Tool Company

Description of Casting	SCHEDULED	Start	Finish
Gear Housing	Cores	5/4/42	5/18/42
Their part no. 165	Molds	5/19/42	5/23/42
Their drawing no. 1374	Clean	5/20/42	5/24/42
	Ship		5/25/42

Castings Ordered 100

We acknowledge, with thanks, receipt of your order and promise to ship as per above scheduled shipping date.

To be shipped via. Pennsylvania R.R.
TO - Name The Blank Tool Company
Address 1264 Factory St.
To be invoiced to you at $35.00 per Casting.
F.O.B. Foundry

SIGNED - (Company Name)
By (Individual Name) (Title)

Converting

An Iron Foundry To Make STEEL CASTINGS

By A. W. GREGG
Executive Engineer
Whiting Corp., Harvey, Ill.

ENORMOUS demand for steel castings created by the war program, has caused many foundries to consider the possibility of converting plants for the production of steel castings. Steel foundries are enlarging their capacity and many large foundries, which have previously been devoted exclusively to the manufacture of gray or malleable cast iron, are planning to install equipment to enable them to manufacture ordnance and other castings required for the war program. An iron foundry which is planning to make such a conversion must consider carefully all factors involved.

Perhaps the first thing to study is the personnel involved. If the molding superintendent or foreman has had some experience in making steel molds, the foundry has a good start on its organization. In many cases it would be necessary to employ a man with previous experience on steel, and at the present time such men are scarce indeed.

Melting department will require the services of a skilled operator, no matter what process is adopted for manufacturing steel. If an open-hearth furnace is to be used, it will be important to secure a competent open-hearth melter, and such a man cannot be trained in less than 2 to 3 years. Unfortunately, some men, after years of experience, lack the ability to become successful open-hearth operators.

The electric furnace also requires an operator with experience and skill, if a satisfactory grade of steel is to be produced. Usually at least a year's time will be required to train a good electric furnace melter and this is an optimistic estimate, unless the man is naturally adapted for that class of work.

The converter process is somewhat simpler in operation and we have known cases where the right kind of man has mastered the process and has been able to operate a converter and produce satisfactory steel with 2 to 3 weeks training. Probably an average man would require 1 to 3 months.

Due to the war emergency many foundries now operating various types of melting equipment have been very co-operative with new steel foundry operators and have permitted untrained men to spend time in their melting departments for training.

The cleaning department has many operations which are not performed extensively in an iron foundry, such as welding, flame cutting, etc. A man familiar with these operations or capable of becoming familiar with them in a short time, will be important. Manufacture of steel castings requires more strict control of all metallurgical operations such as melting and heat treating, and an experienced metallurgist will be a necessary member of the organiza- (*Please turn to page* 148)

Open hearth (extreme left) and cast fittings for Navy (center) OEM Defense Photograph by Palmer. Converter (below) courtesy Henry Clarke, Clarke & Acheson, Chattanooga, Tenn.

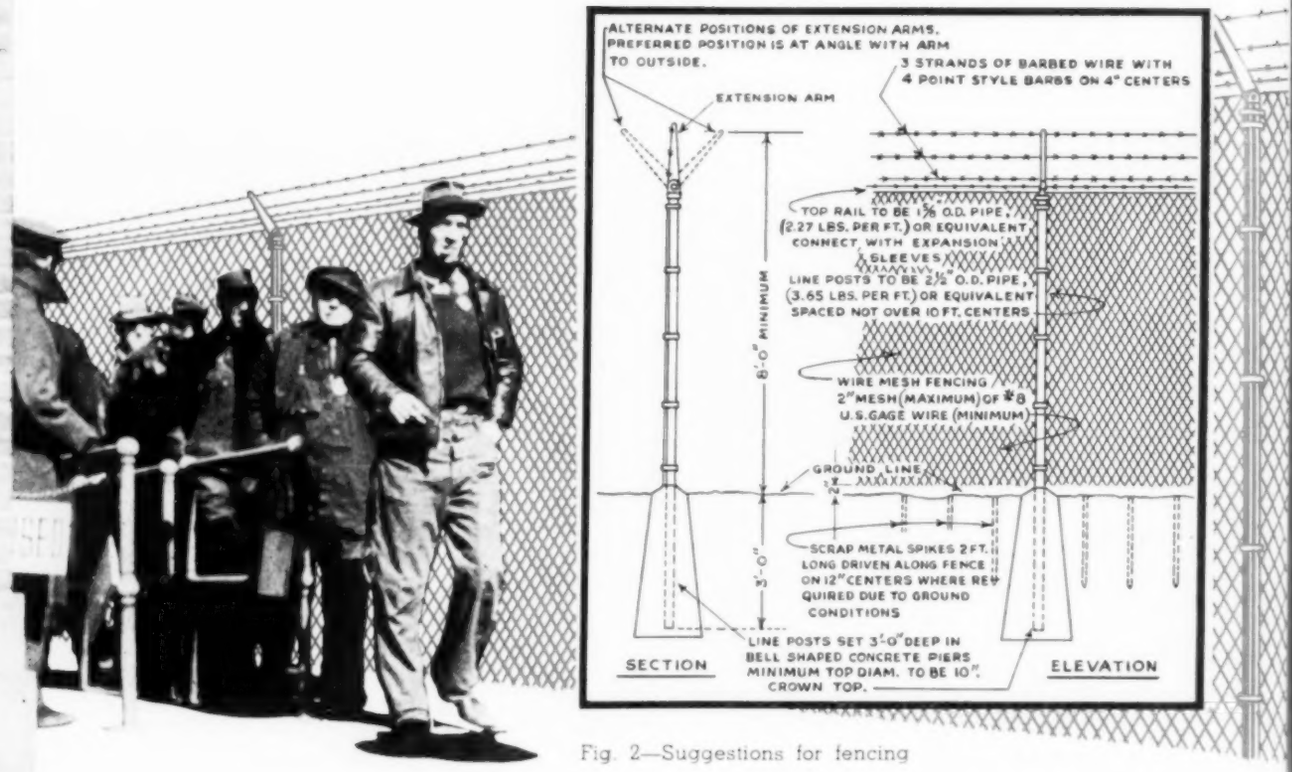

ALTERNATE POSITIONS OF EXTENSION ARMS. PREFERRED POSITION IS AT ANGLE WITH ARM TO OUTSIDE.
EXTENSION ARM
3 STRANDS OF BARBED WIRE WITH 4 POINT STYLE BARBS ON 4" CENTERS
TOP RAIL TO BE 1⅜ O.D. PIPE, (2.27 LBS. PER FT.) OR EQUIVALENT CONNECT WITH EXPANSION SLEEVES
LINE POSTS TO BE 2½" O.D. PIPE, (3.65 LBS. PER FT.) OR EQUIVALENT SPACED NOT OVER 10 FT. CENTERS
8'-0" MINIMUM
WIRE MESH FENCING 2" MESH (MAXIMUM) OF #8 U.S. GAGE WIRE (MINIMUM)
GROUND LINE
SCRAP METAL SPIKES 2 FT. LONG DRIVEN ALONG FENCE ON 12" CENTERS WHERE REQUIRED DUE TO GROUND CONDITIONS
3'-0"
LINE POSTS SET 3'-0" DEEP IN BELL SHAPED CONCRETE PIERS MINIMUM TOP DIAM. TO BE 10". CROWN TOP.
SECTION
ELEVATION

Fig. 2—Suggestions for fencing

PROTECTING LIFE, PROPERTY, AND PRODUCTION

In the Foundry Industry During the War—Part II

SECTION VII (CONTINUED)

(G)—*Groups Responsible to the Co-ordinator.*

(1) *Number of Groups.* All of the groups of plant protection activities should come under the supervision of the plant defense co-ordinator. Depending on the size of the plant, number of employes, relation to other property in the community, assistance available from outside sources, and other factors, it will be determined whether these four major activities will be headed by separate individuals. In very small establishments the plant defense co ordinator may perform all the various functions for the defense of the plant. In somewhat larger plants possibly two or three of the activities can be consolidated under one head. For large plants with high employment and covering extensive area there should be a head for each activity.

(2) *Multiple Shift.* Where the plant is operating multiple shift operation, necessary division or group heads and their respective forces should be provided so that the various activities will function at all hours of the day and week.

(3) *Duties.* General function, responsibilities and activities of the four groups should coincide with the suggested outline as follows:

(a) *Fire Protection Group*

1. *Plant Fire Chief.* Fire protection department should be headed by a plant fire chief. He should have an expert knowledge of fire fighting.

2. *Size of Plant Fire Depart ent.* Size of the group under his control will depend on the size of the plant, fire hazard of the plant, proximity to outside help and other factors.

In large plants many firemen may be full-time men; in the case of very small plants, the firemen may be volunteers selected from the plant personnel. In other plants groups of volunteers may be selected to augment the

Code of Recommended Practices
Developed by the
Industrial Hygiene Codes Committee
of the
American Foundrymen's Association

Reviewed and Passed by the
Office of Civilian Defense

full-time firemen.

3. *Fire Drills.* Whatever the group set-up, fire drills should be conducted at sufficiently frequent intervals so that the management is satisfied that fires can be combated promptly and satisfactorily.

4. *Co-operation of Local Fire Department.* Co-operation of the regular local fire-fighting department organized by law or ordinance should be obtained. The outside fire department should be called in to make an inspection and go over the entire property so that it will become familiar with the property and have first-hand knowledge of construction and contents of the property and its fire-fighting facilities in case the outside fire department is summoned. Suggestions and recommendations as to improving the plant fire-fighting facilities should be sought from the outside fire department.

5. *Recommendations of Insurance Carriers.* Recommendations of the fire insurance carriers for improved facilities or for protection against certain hazards should be checked constantly with the thought in mind of providing maximum protection at all times.

6. *Fire-Fighting Equipment.* Due to the fact that fires may occur through subversive activities and that incendiary bombs or chemicals may be used to start them, extra fire-fighting equipment should be installed in all combustible areas. Buckets or boxes of sand are effective in connection with many types of fires where the ordinary chemical extinguisher or water has little effect. Roofs of buildings that are combustible should be provided with containers of sand and fire equipment made available to put out incipient fires resulting from incendiary bombs from air raids. When sand is supplied for use in connection with fighting incendiary bombs containing magnesium or thermit, it is essential that the sand contain no metallic oxides because oxides in the presence of such fire sources only aggravate the fire. Attention should be given to increasing the amount of fire-fighting equipment available around outside stores of material such as lumber piles and the like.

7. *Housekeeping.* Every plant should be surveyed carefully with the thought in mind of improving and maintaining housekeeping conditions. If powdered coal is used in the plant, the coal should be kept cleaned off rafters, trusses and other places where it settles so that a concussion will not dislodge it into the atmosphere and create danger of explosion.

8. *Rubbish and Flammable Material.* Rubbish and flammable waste or scrap material should not be allowed to accumulate. It should be removed from the premises at least once daily and disposed of for the purpose of minimizing hazards in case of fire or eliminating chances of being set on fire by acts of sabotage. Noncombustible receptacles for all flammable waste should be provided.

9. *Protection of Combustible Material and Buildings.* Grass and weeds should be cut down near piles of combustible material and buildings. Wastes of a flammable nature should not be stored near combustible buildings. Flammable commodities, work in progress or finished products should be segregated as much as possible to minimize potential conflagration areas. Flammable material should be stacked if of such a nature, so as to permit ready access of fire-fighting personnel and equipment to all areas.

10. *Fire Watchers.* Fire watchers during a blackout or air raid should be stationed on towers or roofs so as to command a view of the entire plant property. If plants cover considerable area, more (*Please turn to page* 150)

A·F·A Convention

ACTIVITIES of the 46th annual convention and exhibition of the American Foundrymen's Association and the First Western Hemisphere Foundry Congress, held in Cleveland April 20 to 24, were so extensive that only a portion of the report prepared by the editors of THE FOUNDRY could be presented in the Post-Convention, May issue. Therefore, remaining reports and large collection of photographs taken during the convention are presented in this issue. THE FOUNDRY reproduces many of the photographs through the courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee; Bradley H. Booth, Jackson Iron & Steel Co., Jackson, O.; and Sterling N. Farmer, Sand Products Corp., Cleveland.

An interesting series of lectures on core practices was presented during the five days of convention week by Harry W. Dietert, Harry W. Dietert Co., Detroit. These discussions dealt with all phases from consideration of sources of various types of sand used, binding materials, core mixtures, storage and handling, manufacture and equipment, to defects caused by faulty cores.

First session was held on Monday with Elmer C. Zirzow, National Malleable & Steel Casting Co., Cleveland, presiding. In that lecture Mr. Dietert described various types of core sands and locations of deposits in different parts of the country. He then discussed core binding materials, dividing them into four main classes. First type include those which become firm on freezing, and the only one used is water. Second type are made up of those which become firm at room temperature, and include sodium silicate, portland cement, rubber cement, chemical cements, and silicon esters. Next are those which become firm on baking and include oils, cereals, resins, rosin, sulphite and proteins (glue, casein, gelatin). In the fourth group are the clays. In the discussion of each he described the various characteristics.

Second lecture was held Tuesday afternoon with

SPEED VICTORY
SPEED PRODUCTION
AJAX

COKER
TODAY'S SCORES

HICKMAN

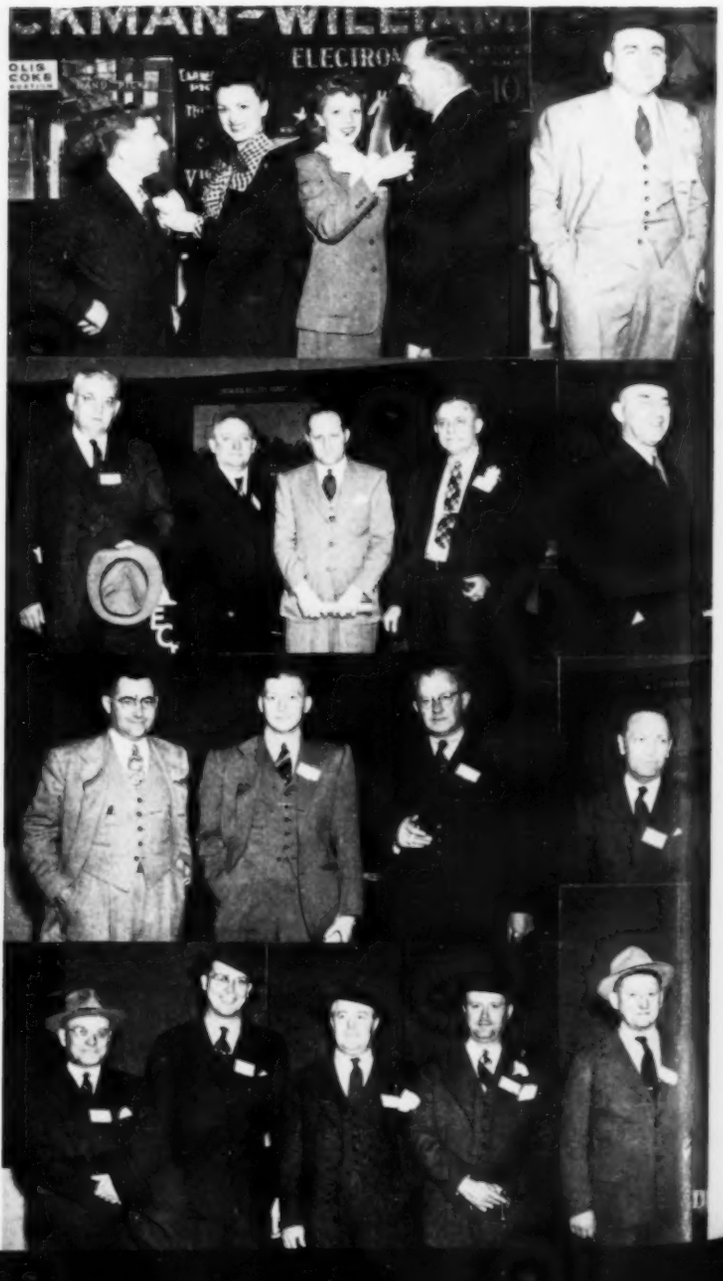
A·F·A CONVENTION

Leroy P. Robinson, Werner G. Smith Co., Cleveland, in the chair. At that session Mr. Dietert spoke on core mixtures for ferrous and nonferrous castings, giving information on mixtures which have given good results. He also gave the physical characteristics and properties which were obtained with the mixtures enumerated. Other phases covered in the lecture were storage and conditioning of core materials, mixing equipment, operations, distribution and storage, etc.

With J. B. Caine, Sawbrook Steel Casting Co., Lockland, O., in the chair on Wednesday afternoon, Mr. Dietert proceeded with the third lecture of the series on core practice and theory. Phases covered included factors affecting core baking, core ovens and their control, and core finishing operations. In addition, a colored motion picture illustrated what occurs to a core at temperatures over 2000 degrees Fahr.

Factors affecting baking include baking rate, type

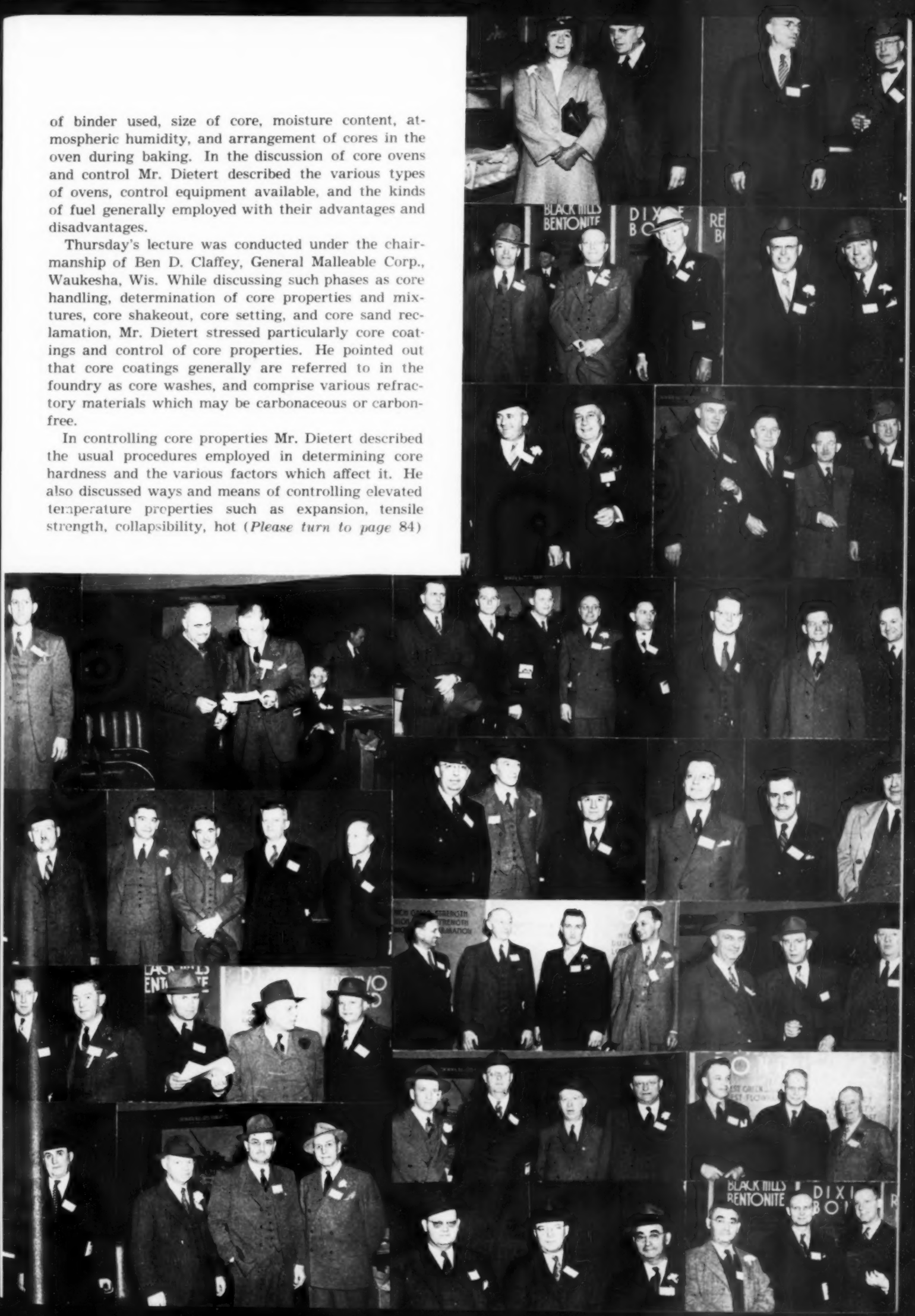
Photos at left courtesy of Sterling N. Farmer, Sand Products Corp., Cleveland. Those below and on opposite page courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee



of binder used, size of core, moisture content, atmospheric humidity, and arrangement of cores in the oven during baking. In the discussion of core ovens and control Mr. Dietert described the various types of ovens, control equipment available, and the kinds of fuel generally employed with their advantages and disadvantages.

Thursday's lecture was conducted under the chairmanship of Ben D. Claffey, General Malleable Corp., Waukesha, Wis. While discussing such phases as core handling, determination of core properties and mixtures, core shakeout, core setting, and core sand reclamation, Mr. Dietert stressed particularly core coatings and control of core properties. He pointed out that core coatings generally are referred to in the foundry as core washes, and comprise various refractory materials which may be carbonaceous or carbon-free.

In controlling core properties Mr. Dietert described the usual procedures employed in determining core hardness and the various factors which affect it. He also discussed ways and means of controlling elevated temperature properties such as expansion, tensile strength, collapsibility, hot (*Please turn to page* 84)



Wants Information on Melting Brass in the Cupola

We are considering melting brass in the cupola and will appreciate information on proper height of bed, blast pressure, impurities picked up by the metal, and possible loss of zinc and lead.

Illustrated articles on melting bronze in the cupola, also answers to questions similar to yours, have appeared on many occasions in THE FOUNDRY. Answering your specific questions briefly, the coke bed is approximately the same height as for melting iron. The blast pressure is 3 or 4 ounces. The metal picks up sulphur, and therefore it is advisable to use a pitch type coke instead of the regular foundry coke. Lead and zinc are lost in abnormal amount; zinc to a greater degree than lead. The loss of zinc is too high in comparison with the loss in other types of furnaces.

Casting Must Maintain Close Dimensional Accuracy

We have an inquiry for a brass casting for an aircraft, sensitive altimeter frame which has certain restrictions relative to expansion under different temperature conditions. For example, it is mentioned that on the L-shape casting with legs about 2 inches long, that the bosses on each should move relative to each other not more than 0.001-inch from minus 50 to plus 180 degrees Fahr. Tensile strength is secondary, but should be strong enough to the extent of machinability to allow good threads.

Since you have been requested to produce the casting in nonferrous alloy, it is reasonable to assume that those drawing up the specification had good and sufficient reason other than just the coefficient of expansion. Nonferrous alloys usually have a higher coefficient of expansion than ferrous alloys, particularly those used in the as-cast form. There is little available data on dimensional changes for nonferrous materials at temperatures below the normal, and particularly at sub-zero temperatures.

Most of the nonferrous compositions cast in commercial quantities and about which there is some information on expansion, do expand rather more than is desirable for use under discussion. Steam or valve bronze covered by federal specification QQ-B-691a, grade 1 containing 89.5 per cent copper, 6.0 per cent tin, 1.5 per cent lead and 3.0 per cent zinc, has as low as coefficient of expansion as any of the red metals. Value for the range from 70 to 200 degrees Fahr. is 0.00000965. That alloy is known as a balanced composition since the copper and tin are in such ratio to form a solid solution, and develop no secondary crystallization.

Since little is known on its subzero characteristics, it might be wise to subject the frames to an anneal before final machining at 1200 to 1250 degrees Fahr. for some length of time, and allow to cool slowly in the furnace. Also that procedure will tend to bring into solution any delta constituent which occasionally forms, even though the elements are in the theoretical ratio to form only a solid solution. The alloy will be strong enough and possess sufficient rigidity for the purpose you have in mind.

Small Malleable Iron Sheaves Show Shrinks at Hub

We are forwarding for your inspection two small malleable iron sheave castings 4 inches diameter, each with a small cavity defect at the point where the cope hub joins the web. We have tried gating these castings with a single gate on the top flange, and with a double gate into both flanges. The gating system does not seem to be a factor. The most peculiar feature is that on some days the defect appears and on other days under apparently similar conditions, all castings are perfect.

The small cavity is caused by shrinkage. The reason it appears at the junction of the hub and web on the cope side is because that is the last area of the casting to solidify. Metal shrinks in passing from the liquid to the solid state. All castings shrink toward the center for the simple reason that the outside forms a shell in contact with the wall of the mold. Gradually as shrinkage continues the shell grows thicker and eventually no liquid metal is available to compensate for the shrinkage in the center. The result is a void or vacuum in the center. If the shell is thin at any point, atmospheric pressure is sufficient to break through to fill the cavity and the result is a small or large passage connecting the cavity with the outside atmosphere.

Gravity is another factor in the problem. Instead of moving uniformly from all directions toward the center of the casting, the greatest pull is downward. Hence foundrymen attempt to compensate for shrinkage by placing risers or reservoirs of metal on top of a casting. So long as the passage between riser and casting remains open, the metal in the riser will sink

into the casting and prevent the formation of a shrinkage cavity. In the present instance a practical solution for the problem is to place a ⅜-inch diameter blind riser 2 inches high on top of the 1-inch hub. A new second edition of *Gates and Risers for Castings*, published at $4 by the Penton Publishing Co., Cleveland, covers theory and application of gates and risers for all classes of castings.

Slag Does Not Run Easily From Small Diameter Cupola

In our 16-inch inside diameter cupola we place 150 pounds of coke on the bed and 30 pounds between the 300-pound iron charges. The usual heat is approximately 1 ton, or seven charges. We add half a soda ash brick about the middle of the heat and the other half with the last iron charge. The slag freezes and the cupola is badly choked before the heat is finished. Blast at 6 ounces pressure enters the cupola through five 3-inch diameter tuyeres spaced equidistantly. Tuyeres are set 10 inches above the bottom and the slag hole at the back is an inch lower than the tuyeres.

Your charges are too large for the cupola and as a result the blast is blowing through the column of metal for too long a time before the following split of coke reaches the melting zone, the area of highest temperature. Heavy charges also cause a fluctuation in the height of the bed. In proper cupola practice the bed coke extends about 3 feet above the tuyeres after it has burned through and settled down. A thin layer of coke then is spread over the bed, the same amount that is used for the succeeding coke splits. The cupola then is charged to the door and the blast is put on. Some melters favor leaving the charge soak for half to one hour before the fan is started.

In this particular case we suggest a metal charge of 90 to 100 pounds, with 12 to 15 pounds of coke between the charges, depending on the character of the coke. Only high grade coke should be used in the cupola and more particularly in a small cupola. The bed coke should be broken to fairly small size, while the size of the coke between charges should not be over 1½ inches. The iron also should be broken into small pieces. The fluxing material, lime stone or oyster shells to the extent of 4 or 5 pounds per charge with a small amount of soda ash, is scattered over the bed and over each coke charge. Construction of the cupola and tuyere area are satisfactory. The only change necessary is in method of operation.

Hard Spots in Manganese Bronze Propellers Caused by Iron

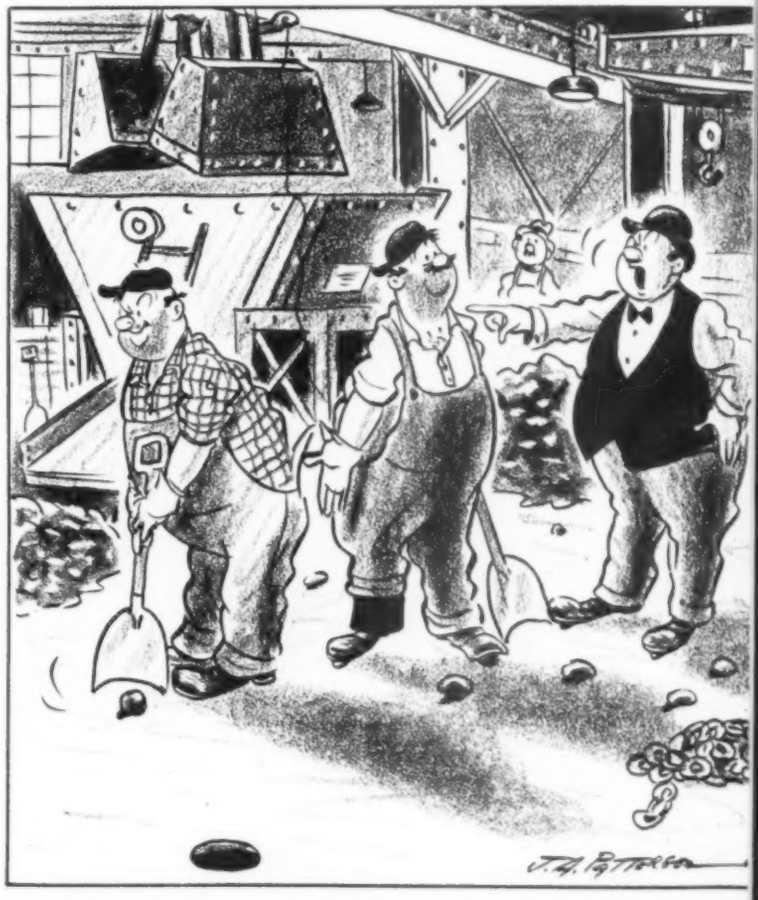
We make manganese bronze propellors for the Navy and recently have run into trouble. The castings when taken out of the sand look perfect but when we machine them spots always show up. The spots always are on the top side and never on the bottom. They are very hard and dull a tool bit instantly.

You do not mention whether you are making the propellers from ingot purchased from some producer or from an alloy you make yourself. That is important since your problem arises from not having the iron all in solution. The iron has combined with carbon to form iron carbide which is extremely hard. If you make your own ingot you will do well to make up a hardener of aluminum and iron with some of the zinc. You probably now melt the copper and plunge the iron into it, later adding the other elements. Presumably the manganese bronze contains around 1 per cent aluminum, 1 per cent more of iron, 32 to 37 per cent zinc, and the remainder copper. Aluminum helps the iron go into solution.

The resulting composition when studied metallurgically will show that the iron has combined with some of the aluminum and some of the zinc, but no longer is in solution in the copper. If however, the iron is permitted to combine with carbon due to insufficient deoxidizing agents, you will have hard iron carbide. Sometimes you can correct that difficulty by melting the alloy at a high temperature, and stir in 0.25 to 0.50 per cent maximum aluminum, and then skim the bath thoroughly. In that way you tend to clear the bath of the hard crystals and the metal can be poured into castings with the minimum of hard spots.

If you are buying the manganese bronze in ingot form, get in touch with your supplier and call his attention to the trouble. No doubt he will suggest the best possible procedure for eliminating the trouble.

GANGWAY! By J. A. Patterson



"I don't give a hoot if he's a hundred beers up on you—I said you and Walt Hagan there get back to your jobs."

Melt Metal Borings In the Cupola

We shall appreciate information on how to melt approximately 100 tons cast iron and steel borings per year. Our heats run from 25 to 30 tons per day melted in a cupola lined to 45 inches. The amount of material available does not warrant the installation of elaborate equipment.

The most satisfactory method of preparing cast iron and steel borings, chips and turnings is to compress the material into briquets weighing from 5 to 10 pounds. A method developed many years ago and still in use in several plants is to pack the borings in tin cans or in pieces of stove pipe. The bottom edge of the stove pipe is crimped inward and a thin disk, iron or steel, is dropped into place.

The pipe then is filled with borings, either packed down with a hammer or placed on a jolt machine. A second disk is placed on top and the edge of the pipe crimped down. One pipe full of borings per week means between 600 and 700 pounds per day. An ordinary length of stove pipe will hold approximately 60 pounds of borings which works out to about 12 cartridges per heat. Assuming that your iron charges are 1500 pounds each, you will require from 33 to 40 charges for the daily heat. Therefore, the cartridges may be dropped in every second or third charge.

Iron Might Replace Brass Castings

Most of our castings are made from nonferrous metals. Since these metals are scarce at present, we are wondering if some of our products could be made of semi-steel. We have an idle 24-inch cupola. We shall appreciate information on what tonnage we might expect to get and any other related information.

We see no particular reason why a considerable part of your product would not serve satisfactorily if made of cast iron instead of any of the nonferrous metals. You could make them of gray iron or semi-steel as you term it, but since the element of high strength is not a vital factor in any of the items listed on your letterhead we see no necessity for adding steel to the cupola charge. Unless some member of your staff is an expert cupola man, the addition of steel to the charge may create a lot of trouble.

A 24-inch inside diameter cupola has a normal melting capacity of 1-ton per hour. Under proper melting and slagging conditions it may be kept in blast all day. Instances are on record of small cupolas melting continuously for a week, night and day. On all day heats the cupola will melt about 8 tons. On light castings the return sprues, gates and scrap will average 40 per cent, or 6400 pounds, leaving a net yield of 9600 pounds castings. The most unfortunate feature of the whole present situation is that you probably will have as much difficulty in securing pig iron and cast iron scrap as you now have with the nonferrous metals.

Methods for Making Grinding Balls

We shall appreciate any available information on the methods and materials employed in making chilled iron grinding balls.

Chilled cast iron grinding balls are made in two-part cast iron molds mounted vertically instead of horizontally. One part is attached permanently to a foundation, while the other part is mounted on slides which permit the mold to be opened and closed. The overall size and thickness of the mold of course vary with the size of the balls to be cast. However, in a general way it may be said they are heavy and thick to absorb the heat of the castings over a prolonged period of operation without distortion.

In small installations they may be clamped or held together with latches, but in the large installations where the battery may contain from one to two dozen molds, the movable halves are actuated by hydraulic power. This applies particularly to molds for balls from 4 to 8 inches diameter. Molds for small balls, 1 to 2 inches diameter have mold depressions on both sides with the exception of the end sections. The two halves assembled in a vertical position, slide on a base, and are light enough to be moved by hand power. The entire battery is jammed together and then the two ends are blocked and wedged against suitable supports. The mold cavities are arranged in a double row with the vertical runner in the center. A small gate conducts the metal from the runner into each mold cavity. Incidentally the gating method and other features of these molds are described in *Gates & Risers for Castings*, published by the Penton Publishing Co., Cleveland. Large balls are cast 8 to 12 in a mold, while in the smaller sizes in four columns the number may range from 16 to 30. Molds are made from a comparatively soft gray iron. Approximate analysis of the ball iron is: Silicon 0.75 per cent, manganese 0.50 per cent, sulphur 0.15 per cent, phosphorus under 0.40 per cent, total carbon above 3.75 per cent. In certain instances the entire cupola charge is scrap steel with alloy additions of chromium, nickel and chromium, molybdenum, etc.

Acids for Pickling Bronze Castings

What is the composition of the bath employed for pickling bronze castings?

Nitric and sulphuric acids either singly or in combination are employed as a bath designed to restore the bright metallic color to the castings. In certain instances nitric acid alone is used. In other instances the acid or acids are diluted with water. All of which is just another way of saying that the composition of the pickle bath depends to some extent on the composition of the castings, and to some extent on the exact shade of color desired in the finished casting. In that connection one can be guided only by experience and experiment. A mixture of half and half nitric and sulphuric acids is quite satisfactory for most of the copper base alloys.

The castings are dipped in this bath for a few seconds and then washed in hot running water and allowed to dry of their own heat. They may be taken from cold running water and dried in saw dust. Immediately after the castings are dried, they are sprayed or brushed with a light coating of clear or colorless lacquer to preserve the finish. In a second slightly different process, also widely employed in the sheet brass industry, the objects first are dipped in solution made up of 1 part sulphuric acid to 10 parts water. In certain instances the sheets or castings then are washed and dried. However, usually they are subjected to a second treatment with acids to impart variations in color. The actual pickle either is nitric acid by itself or a combination of two parts nitric acid to one part sulphuric acid.

In a general way the relative proportions of the two acids vary according to the zinc content of the metal. For example yellow brass with high zinc content reacts readily to the 2 parts nitric, one part sulphuric combination. The red metals clean up readily in a bath containing equal parts of each. In this instance it is not out of place to direct your attention to the fact that they are extremely hazardous and should be handled only by men with the necessary skill and experience. The operators should wear suitable rubber clothing and the acid bath should be prepared and kept in a stoneware container. For a complete description of the process, equipment and hazards involved you should read section VIII *Code of Recommended Good Practices for Metal Cleaning Sanitation*, published by the American Foundrymens Association.

Helpful "Staff Work"

IN THE BATTLE OF PRODUCTION

All over America, engineers and production men are converting plants to war needs. These men know they can... upon request... get helpful suggestions from us about ways to speed up the working of metals and alloys.

This helpful information has been mobilized into convenient charts, pamphlets and other printed pieces. These tools-in-type range from technical data for engineers to simplified reports on performance of alloys containing Nickel under specific operating conditions.

Here, also, are correlated latest reports from the field about selection, fabrication and uses of ferrous and non-ferrous Nickel Alloys.

And, as further support for your battle of production, we offer personal assistance from members of our technical staff. With recent experience in many plants facing materials difficulties, these men become especially helpful. During wartime, Nickel... and information about Nickel... must go where it best serves the United Nations.

☆ ☆ *Nickel*

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

men of industry

RAY FARABEE, formerly professor of metallurgy and metallurgical engineering, University of Alabama, has been appointed assistant manager of the Holt, Bessemer and Anniston, Ala., plants, Central Foundry Co. Mr. Farabee has served as consulting metallurgist for the firm during the past several years in addition to his duties on the university's faculty. He graduated from the University of Alabama as a metallurgical engineer and also holds a master of science degree from that school. Following graduation he worked 4 years in the mines and steel mills of the Gulf States Steel Co., now owned by Republic Steel Corp. For 2 years he engaged in research work on concentration of low grade iron ores of Alabama with the Alabama School of Mines Experiment Station, in co-operation in the U. S. Bureau of Mines. In 1926 he was appointed assistant professor of metallurgy at the Capstone. In 1929 and 1938 he was granted leave of absence to teach chemical and metallurgical engineering at Purdue university.

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MAJOR JOHN SLEZAK is on leave of absence as president, Turner Brass Works Inc., Sycamore, Ill., and has been assigned new duties as chief of the tank and combat vehicles division, Chicago Ordnance District. Major Slezak's business associations include 7 years as an engineer with the Western Electric Co., where he became head of the metal machining methods division.

Office of W. R. Bean, Chief, Foundry Equipment and Supplies Unit, War Production Board, has been moved to Room 4520 New Social Security Building, Washington. The telephone is REpublic 7500, Extension 4081.

He joined Turner Brass Works as an engineer in 1930, and was promoted to works manager, later becoming vice president and general manager. In 1939 he was elected president of the company.

• • •

ARTHUR H. LOSEY has been appointed to the staff of the Automatic Polishing and Buffing Division, Hammond Machinery Builders Inc., Kalamazoo, Mich. Mr. Losey started as an apprentice in his father's job plating shop in Kansas City, Mo. For the past 6 years he was associated with the J. C. Miller Co., Grand Rapids, Mich., as engineer and advisor on all polishing and buffing problems.

• • •

DANIEL P. MURPHY has been appointed general manager of the Symington-Gould Corp. plant in Depew, N. Y. He succeeds CHARLES H. SCHAFFER. Mr. Murphy formerly was assistant superintendent of the corporation's plant in Rochester, N. Y.

* * *

MARCEL REYMANN recently was made superintendent of the gray iron shop, Atlantic Foundry Co., Akron, O.

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JOHN H. COLLIER, president, Crane Co., Chicago, has been conferred the honorary degree of Master of Industry by Purdue University, Lafayette, Ind.

• • •

EARL L. SHANER, president and treasurer, the Penton Publishing Co., Cleveland, publisher of THE FOUNDRY and other business papers, has been elected president of the Associated Business Papers for 1942-43. Mr. Shaner, who joined the Penton company in 1916, was made president of that organization in 1937.

JOSEPH HILDRETH, vice president, Chilton Co. Inc., Philadelphia, has been elected vice president of the association, and KINGSLEY L. RICE, president, Technical Publishing Co. Inc., Chicago, has been named treasurer. W. J. ROOK, president, W.R.C. Smith Publishing Co., Atlanta, Ga., is chairman of the board.

• • •

CHARLES M. SCHOENLAUB has been appointed acting chief of the Production Requirements Branch, War Production Board. Mr. Schoenlaub

(*Continued on page* 72)

Ray Farabee

Arthur H. Losey

Major John Slezak

Woodward

● ● ● —

Uniform

PIG IRON

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

(*Continued from page* 70)

joined the staff of the Office of Production Management on July 31, 1941, as a staff advisor in the Priorities Division. Since March 15, 1942 he has been special assistant to A. L. Williams, Chief of the Production Requirements Branch, and will serve as Acting chief of the branch because of the illness of Mr. Williams. Before going to Washington, Mr. Schoenlaub was assistant superintendent of the open hearth department, Republic Steel Corp., Cleveland.

♦ ♦ ♦

FRED H. CLAUSEN, president, Van Brunt Mfg. Co., Horicon, Wis., since 1919 has been appointed to the board of directors of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

♦ ♦ ♦

WALTER GEIST, formerly vice president, has been elected president, Allis-Chalmers Mfg. Co., Milwaukee, to succeed W. C. BUCHANAN who resigned recently due to ill health.

♦ ♦ ♦

J. H. JOHNSTON, formerly assistant superintendent, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., recently resigned to become connected with the General Steel Castings Corp.

♦ ♦ ♦

F. J. TONE JR., Carborundum Co., Niagara Falls, N. Y., was elected second vice president of the American Supply & Machinery Manufacturers' Association at the meeting held in Atlantic City recently.

♦ ♦ ♦

LAWRENCE Y. SPEAR, New London, Conn., has been elected president, Electric Boat Co., Groton, Conn., succeeding the late Henry R. Carse. Mr. Spear formerly was vice president in charge of designing, contracting and building.

♦ ♦ ♦

GORDON MCMILLIN, metallurgist, Standard Brake Shoe & Foundry Co., Pine Bluff, Ark., and Memphis, Tenn., has resigned to join the General Steel Castings Corp., Eddystone, Pa., as metallurgist.

♦ ♦ ♦

A. J. MOSES has been elected vice president of the Combustion Engineering Co. Inc., New York. Mr. Moses, a graduate of Georgia School of Technology, has been connected with Combustion Engineering Co. or its constituent companies since 1920.

♦ ♦ ♦

JAMES F. EDNIE, formerly associated with the metallurgical and research department, Federated Metals Division, American Smelting & Refining Co., has become chief metallurgist, technical and metallurgical department, Duquesne Smelting Corp., Pittsburgh.

♦ ♦ ♦

H. M. BRUNDAGE has been appointed chief of the newly created appliance section, Plumbing and Heating Branch, WPB. Previously, Mr. Brundage managed his own business, the H. M. Brundage Co., Richmond, Va.

♦ ♦ ♦

West Steel Casting Co., Cleveland, recently elected the following officers: President and treasurer,

Ralph R. West

S. B. West

RALPH H. WEST; vice president and sales manager, RALPH R. WEST; secretary, D. P. LANSDOWNE; assistant to president, BERT GRAVES; assistant secretary-treasurer, E. L. TULLIS; superintendent, machine shop division and sales engineer, S. B. WEST.

♦ ♦ ♦

JOHN A. FINLEY has been appointed a research engineer on the technical staff of Battelle Memorial Institute, Columbus, O., and has been assigned to research in metallurgy. Mr. Finley, a graduate of Michigan College of Mines and Technology, formerly was associated with the Carnegie-Illinois Steel Co., Chicago.

♦ ♦ ♦

W. C. BUCHANAN has resigned as president of Allis-Chalmers Mfg. Co., Milwaukee, because of ill health. Mr. Buchanan retains his membership on the board of directors and executive committee of the Allis-Chalmers company. The directors elected WALTER GEIST, executive vice president.

♦ ♦ ♦

L. C. RHODES has been appointed manager of the San Francisco office, Sullivan Machinery Co., succeeding the late Perry W. Olliver. Mr. Rhodes' duties as manager in the Butte-Spokane district will be taken over by ROBERT T. BANKS, whose headquarters will continue to be in Salt Lake City.

♦ ♦ ♦

ALBERT A. HANIFORD recently was appointed to the sales department of Manning, Maxwell & Moore Inc., Bridgeport, Conn., to extend that organization's program of sales training for company salesmen. Mr. Haniford previously was assistant to the director of dealer relations, Johns-Manville.

♦ ♦ ♦

CHARLES M. CRAIGHEAD has been appointed a research metallurgist on the staff of Battelle Memorial Institute, Columbus, O. Mr. Craighead formerly was associated with the Aluminum Co. of America, Reynolds Metals Co., and the Braeburn Alloy Steel Corp. He is a graduate of Pennsylvania State College.

♦ ♦ ♦

ROBERT D. WILLIAMS has been appointed a research engineer, Battelle Memorial Institute, Columbus, O., where he will assist in the institute's welding research. Mr. Williams formerly was a member of the faculty in the department of mechanical engineering, University of Illinois, where his work was in welding and welding metallurgy.

♦ ♦ ♦

HOWARD COONLEY, chairman of the board, Walworth Co., has been appointed chief of the Simplification Branch, Bureau of Industrial Conservation, War Production Board, Washington, succeeding Dr. Edwin W. Ely, who has been called back to his post as chief of the Division of Simplified Practice, National Bureau of Standards.

♦ ♦ ♦

ARTHUR LINZ has been appointed vice president, Climax Molybdenum Co., and will be in charge of its conversion plant at Langeloth, Pa. He succeeds ALLEN KISSOCK, who has resigned. In addition to the management of the Langeloth operations, Mr. Linz will continue to direct the activities of the company in its chemical field.

♦ ♦ ♦

EDWARD PAYSON BULLARD III has been elected vice president in charge of manufacturing, Bullard Co., Bridgeport, Conn. JOHN A. BULLARD,

(*Concluded on page* 74)

How to S-T-R-E-T-C-H Your Core Ovens

TRULINE BINDER

Reg. U.S. Pat. Off.

If you want to s-t-r-e-t-c-h your core ovens—get more cores through per shift—without extra cost—consider the experience of many foundries—now using Truline Binder—who find their core output substantially increased, sometimes even *doubled.*

Here's how. Truline-bonded cores bake fast—often with twice the speed of oil-bonded mixes. Thus ovens are s-t-r-e-t-c-h-e-d. And time spent in cleaning cored surfaces is also cut down, sometimes 30 to 50%, because cores bonded with Truline collapse *fast.*

Where conditions are right*, Truline can do an excellent job for you. At least, that's the experience of an ever-growing number of foundries now using it. Why not ask for the impartial advice of our Truline service man in your district?

* **TRULINE BINDER** is useful in cores for steel, grey and malleable iron, brass, bronze, aluminum, and magnesium castings. Wherever bank sands, reclaimed sands, or natural-bonded sands are a part of the picture—wherever high collapsibility is wanted—or where thin metal sections must be protected—Truline Binder is indicated as a real time-saver.

NAVAL STORES DEPARTMENT

HERCULES POWDER COMPANY

INCORPORATED

999 MARKET STREET • WILMINGTON • DELAWARE

JJ-66

(*Concluded from page 72*)

sales engineer and J. W. C. BULLARD JR., associated with the purchasing department, have been elected to the board of directors. E. P. BULLARD JR., has been re-elected president and E. C. BULLARD, vice president and general manager.

♦ ♦ ♦

THOMAS B. MYERS, vice president and general manager, Scovill Mfg. Co., Racine, Wis.; WILLIAM W. COLEMAN, president, Bucyrus-Erie Co., South Milwaukee; and FRANK R. BACON, president and director, Cutler-Hammer Inc., Milwaukee, have been appointed to the Advisory Board, Chicago ordnance district by Col. Donald Armstrong, district deputy chief.

♦ ♦ ♦

JEROME G. BOWER is one of eight consultants recently appointed by the Materials and Equipment Section, Office of Defense Transportation, Washington. Mr. Bower will have charge of castings and miscellaneous items required in rail transportation manufacture and maintenance. He formerly was eastern representative, Buckeye Steel Castings Co., Columbus, O., with offices in New York.

♦ ♦ ♦

ROBERT H. RIDGWAY, for many years an authority on mineral economics and statistics, has been appointed chief of the Coal Economics Division, Bureau of Mines, Department of Interior, succeeding F. M SHORE, who has been promoted to assistant chief of the bureau's Economics and Statistics Branch. Mr. Ridgway has been in the Washington office of the Bureau of Mines since 1928.

♦ ♦ ♦

THOMAS DREVER, president, American Steel Foundries, Chicago, has been elected to the board of trustees, Armour Research Foundation of Illinois Technological Institute, Chicago. CHARLES W. HILLS JR., Charles W. Hills, Chicago, patent attorneys, was elected president of the board, succeeding GEN. THOMAS S. HAMMOND, who resigned recently as president of the Whiting Corp., Harvey, Ill., to devote full time as a civilian member of the Chicago Ordnance District staff.

♦ ♦ ♦

EDWIN J. SCHWANHAUSSER, vice president, Worthington Pump & Machinery Corp., Harrison, N. J., has been elected to the board of directors to fill the vacancy created by the death of Edward T. Fishwick. Mr. Schwanhausser has been a vice president of the corporation since 1939, and a member of the Worthington organization since his graduation from Stevens Institute of Technology in 1915. For 14 years he was connected with the Harrison, N. J. works, being appointed assistant manager in 1927. In 1929 he was appointed manager of the company's Buffalo works.

Celebrate 30 Years With Penton

To celebrate 30 years of continuous service with the advertising department of the Penton Publishing Co., Cleveland, A. L. Klingeman of Cleveland and L. C. Pelott of Chicago were

A. L. Klingeman

L. C. Pelott

guests of honor at a luncheon held recently at Hotel Cleveland and attended by 150 business associates. Mr. Klingeman became connected with the Penton organization on March 11, 1912, and Mr. Pelott joined the company two months later on May 13, 1912. For practically the entire period of service, both men have been connected with The Foundry, and have a wide circle of friends among foundry equipment and supply manufacturers and distributors.

MARY P. HAMILTON, widow of Everett R. Hamilton, has been elected president of the National Pressure Cooker Co., Eau Claire, Wis., succeeding her husband, who died recently. A. A. DEBONVILLE has been placed in charge of operations and management as general manager, with WILLIAM E. WAHL as his assistant. THOMAS G. HANEY, sales manager, also has been elected treasurer. E. H. WITTENBERG remains plant superintendent.

♦ ♦ ♦

DR. HUGH S. TAYLOR, chairman, department of chemistry, Princeton University, Princeton, N. J., has been awarded the Longstaff medal of the Chemical Society of London. The medal is conferred every three years upon a fellow of the society "who, in the opinion of the council, has done most to promote the science of chemistry by research." Mr. Taylor received the Nichols medal of the American Chemical Society in 1928, and is a member of a number of scientific groups.

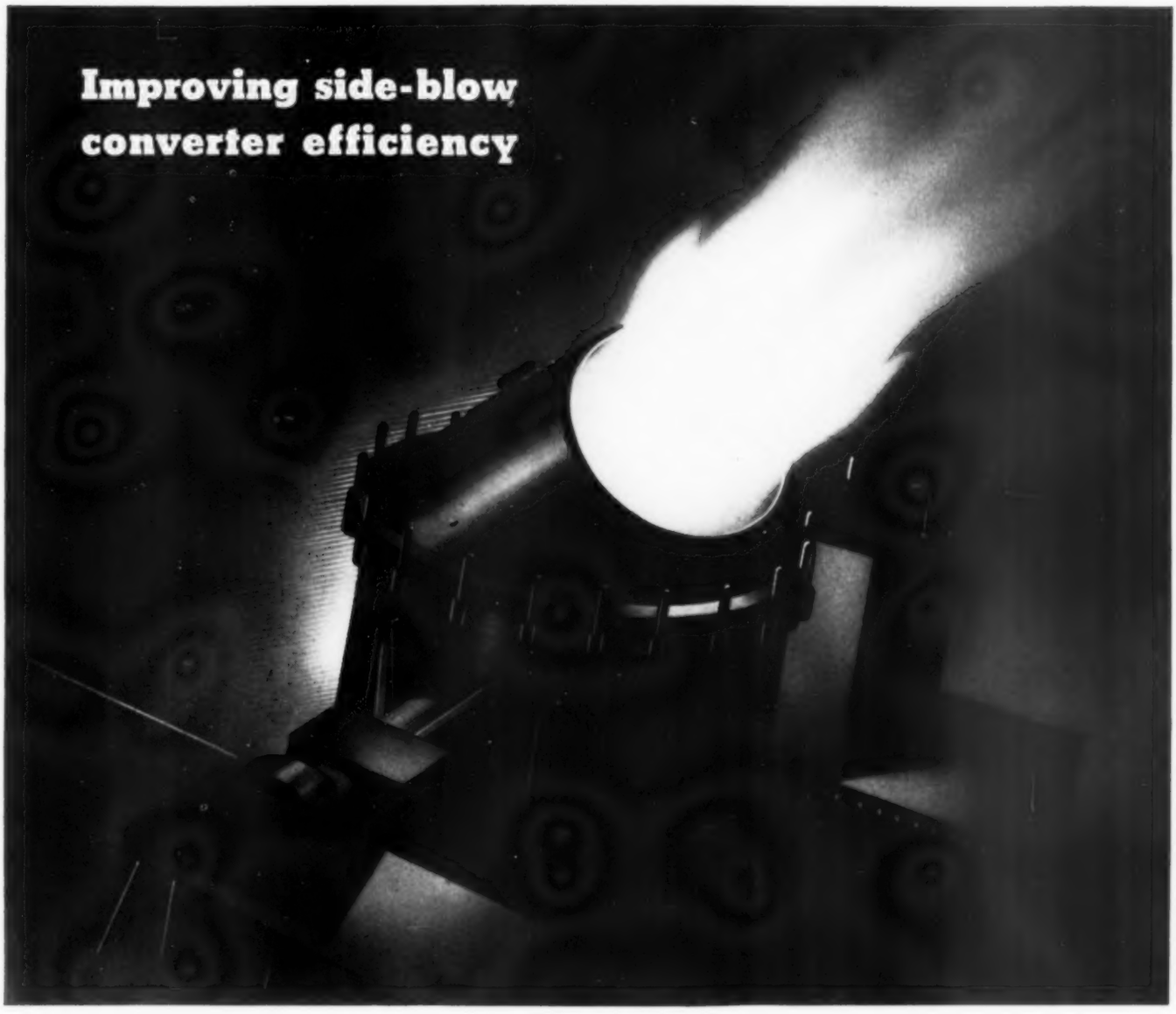
♦ ♦ ♦

CHEEVER J. DIXON recently was made tool liaison supervisor, Des Moines Ordnance Plant, Des Moines, Iowa. This plant is operated by the United States Rubber Co. Mr. Dixon received a degree of bachelor of mechanical engineering from Marquette University, Milwaukee, in 1933. For 2 years he taught Metallurgy and heat treating at West Allis Vocational High School, West Allis, Wis. For 8½ years he was connected with the International Harvester Co., Milwaukee, in various departments as machinist, inspector and metallurgical assistant. After leaving that organization he was employed by Ampco Metals, Inc., Milwaukee, in charge of the Centrifugal Casting Division. In August 1941 he accepted a civil service appointment as inspector of Naval Materials, U. S. N. at Milwaukee, being stationed at the Nordberg Mfg. Co. plant.

Book Review

A.S.T.M. Standards on Copper and Copper Alloys, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia, 350 pages, 6 x 9 inches, paper, $2.00.

The compilation was prepared to provide a convenient form for ready reference of the various specifications and tests issued by the society covering copper and copper base products. Sixteen specifications for copper base alloys for sand castings include the important classifications of that type of alloy. The book, sponsored by committee B-5 on copper and copper alloys, cast and wrought, also includes specifications developed by committee B-1 on copper and copper alloy wires for electrical conductors and selected specifications prepared by committee B-2 on nonferrous metals.



Information taken from "The Foundry"

Control of the composition of the charge adds considerably to the efficiency of side blow converters.

The recommended silicon content of the converter charge is from 1.50 to 2.00%, and the recommended manganese content 0.40-0.60%. This ratio permits young blowing without thinning the slag or causing slag deposits on the converter lining.

Sulphur should be low (0.045%) and phosphorus should also be about 0.045%. The sulphur content can be controlled by desulphurizing the charge in the ladle, by adding either sodium carbonate, or calcium carbide.

Phosphorus content can be controlled either by selection of charge materials or by dephosphorizing the steel in the ladle.

A successful dephosphorizing method (the Yocum Process) consists essentially of adding a mixture of 50% impure lime, 30% dried roll scale and 20% flux to the stream when pouring. This material forms a dephosphorizing slag in the ladle.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTES FOR THE CUPOLA · FERROMOLYBDENUM FOR THE LADLE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

among Detroit foundries

BY A. H. ALLEN
Detroit Editor, The Foundry

EFFORTS to "make a lady" out of bessemer steel in the foundry, principally by means of the so-called triplex process of cupola, bessemer and electric furnaces, roll merrily along. They sometimes bring a wry smile to the faces of old-timers in the steel foundry business who over the years have seen bessemer steel succumb to the "magic" appeal of electric steel.

S. Wells Utley, president of Detroit Steel Casting Co., told foundrymen here the other evening that his company operated a Robert sideblow converter from as far back as 1888 continuously until 1927, when the "sales resistance" to bessemer steel dictated its suspension in favor of acid open-hearth and acid electric steel. A contributory cause was the availability of large quantities of all grades of scrap iron and steel in the Detroit area, which made pig iron a more expensive raw material and hence put a further squeeze on the bessemer process.

Scrap in the form of turnings, readily melted in the electric furnace, always has been a drug on the market for blast furnace and cupola operators, principally because of its large bulk and the messy handling problem. Briquetted, it is not so bad, but only recently have adequate briquetting presses been installed to handle it. Currently the proportion of turnings to the total scrap available is increasing steadily and it appears likely to continue upward because of the nature of war production work. Busheling and bundled sheet scrap are becoming scarce, compared with lush automotive days.

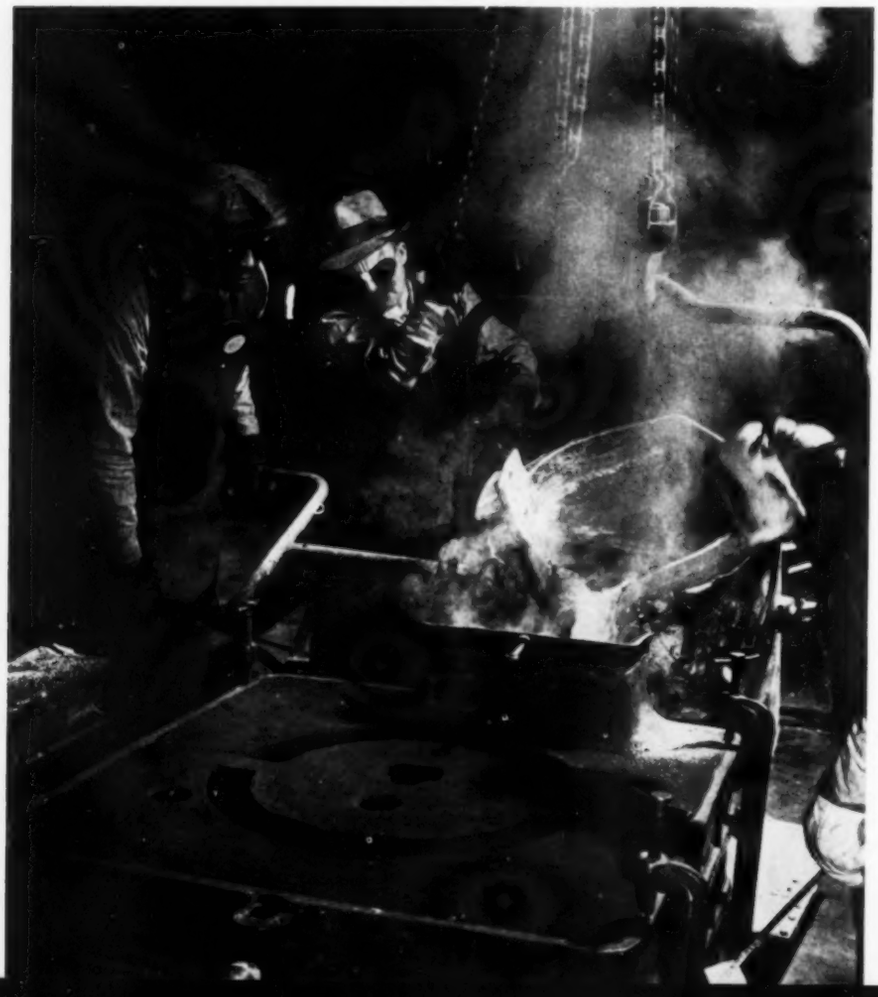
But getting back to foundry converters, their new dignity today springs from the fact that the war program has stepped up the demand for steel castings tremendously, with smaller needs for cast iron. Thus iron foundries are looking into the possibility of making a quick shift to steel. They find that army specifications for cast steel first approved converter steel — QQ681-A—then disbarred it—QQ681-B—on the grounds of low impact strength at low temperatures. For acceptance for certain purposes, converter steel apparently must be further processed in an electric furnace, although among metallurgists there is serious doubt that such processing in an acid electric accomplishes anything beyond keeping the metal at temperature before pouring.

Rejection of converter steel as such seems to be based on tests made years ago at Bethlehem Steel Co. by Epstein, indicating that steel from a bottom-blow converter showed poor shock-resisting properties at low temperature. Actually this steel was somewhat high in sulphur, phosphorus and nitrogen, and was not typical of steel made in the sideblow 3-ton converter used in foundries today. To disprove the early tests, samples of modern converter steel are being rushed through tests at Battelle Memorial Institute, Watertown Arsenal and other laboratories under supervision of the Tank and Combat Vehicle Division of WPB, and it is confidently expected by such converter experts as A. W. Gregg of Whiting Corp. that the steel ultimately will be approved for uses where shock is involved at low temperatures.

Mr. Gregg spoke at length to Detroit foundrymen recently, outlining essential phases of the triplex proc

(*Concluded on page 78*)

Pouring a large casting in magnesium at the Ford Motor Co. magnesium foundry. Note operator at extreme right ready to sprinkle powder from shaker should any signs of burning metal develop



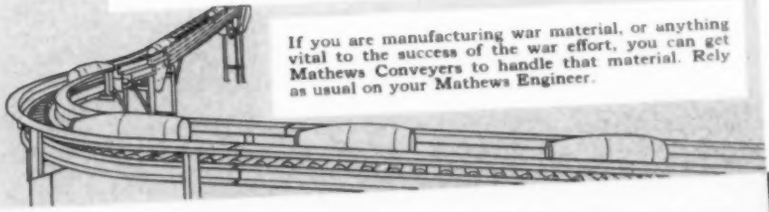
MATHEWS CONVEYERS FOR MECHANIZED HANDLING

Speeding THE TOOLS OF Victory

● TIME WAS NEVER MORE PRECIOUS than in this national emergency. Every step that can be saved . . . every unnecessary motion that can be eliminated . . . every ounce of energy that can be conserved helps to speed the tools of victory.

Keeping munitions, materials, and machinery supplies moving faster and with less worker fatigue is the function of Mathews Conveyer Systems.

Mathews engineers have helped hundreds of manufacturers of war material speed up production schedules with no increase in man-and-machine hours!



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYER CO.

Ellwood City, Penna.

(*Concluded from page 76*)

ess (THE FOUNDRY, March, page 66), involving initial melting in the cupola, blowing down manganese, silicon and carbon in the bessemer, and refining in the acid electric. Additional steps include desulphurizing and, if necessary, dephosphorizing. Elimination of phosphorus is likely to prove troublesome. One possibility is the process developed by Gordon Yocum principally for large heats of steel in open-hearth shops, but adaptable to minimum heats of 5 tons. By this process phosphorus can be reduced from, say, 0.10 per cent to 0.03 per cent in 30 minutes. Cost is on the basis of $1 per ton. A modification of the process has been tried on 3-ton converter heats, but as yet has not been entirely perfected. At least there is the hint that eventually the method may be brought to the point where it is practical on small heats.

Of course it is possible to dephosphorize in the basic-lined converter with a lime slag, this being done abroad, particularly in Germany where iron ores are high in phosphorus. The treatment requires something like 1.5 per cent phosphorus in the metal to begin with, which is obviously far beyond even high-phosphorus steel in this country. However, the suggestion has been made that by adding phosphate rock in the cupola, phosphorus content might be brought to the point where dephosphorizing in the basic converter would be feasible. Still, the basic converter suffers to some extent by virtue of poor refractory life. Close control also is essential, because the phosphorus comes out quickly in what is described as the after-blow of the converter.

Several plants in England, where converter steel has a good reputation for castings, are reputedly using rotary furnaces of the Sesci type to melt down steel, remove manganese and silicon to desired limits and supply a superheated metal to bessemers which blow only on carbon, yielding an exceptionally high-grade and clean steel, acceptable for virtually all ordnance specifications. Paul Fassotte, a Belgian by birth and now associated with the Ministry of Supply in London, has been active in this work and also originally developed the Sesci furnace to produce controlled pig iron and malleable irons for specialty melting requirements. One of his early associates in the casting business, another Belgian, the late Paul Deschamps, managing director, Kryn & Lahy Ltd., was recognized as being one of the most distinguished bessemer converter experts in Europe. Both of these metallurgists were intimate friends of Fred A. Melmoth, vice president, Detroit Steel Casting Co., Detroit, who prior to coming to this country spent many years in steelmaking and foundry plants in England.

Another piece of the fine raiment being used to "make a lady out of Bessie" is the Jones & Laughlin electric eye control for converters. It appears to be a valuable tool to assist blowers in gaging just the proper instant when the bessemer blow is finished, and reportedly can "catch" carbon content within 0.05 per cent. Skilled bessemer blowers, both in this country and in England, have long been considered "born with the touch" and have passed their skill along from father to son. Their numbers have dwindled with the lapse of the bessemer process of steelmaking in this country, but there are a few still in the game.

Comparison of the electric eye control with the skill of the best bessemer blower has proved that the former can easily match and often surpass the human eye. Obviously the electric control does not make bessemer operation completely automatic. It must be understood and its limitations appreciated.

The photoelectric system for bessemers is installed by J. & L. for six months' free trial and if accepted is licensed on the basis of 5 cents a ton in steel mills and 10 cents a ton in foundries.

Examining again the matter of scrap turnings, Mr. Gregg mentioned the case of one steel plant in this country which recently located a source of 300 tons of turnings a day. Three briquetting presses were installed to supply melting stock for cupolas which are charged with as high as 70 per cent briquets. Cupola metal then is blown in bessemers and finally transferred to 40-ton basic electric furnaces, with dephosphorizing by the Yocum process. Deoxidizing and alloying are carried out in the electrics and by virtue of the triplexing the power demand on the electrics has been reduced from 750 to 300 kilowatts per ton, output has been increased 100 per cent over former practice.

Use of the basic electrics as a part of triplexing avoids the "metallurgical hypocrisy" of turning bessemer steel into acid electrics which serve as holding furnaces and therefore may not appreciably alter the properties of the converter steel. In fact, there are grounds for belief that properties of such steel might deteriorate if it is kept too long in the electric furnace in the deoxidized condition.

Continuous conveyor system handling molds in Ford magnesium foundry. In foreground are two large engine castings after being shaken out of sand. Note extensive risering.

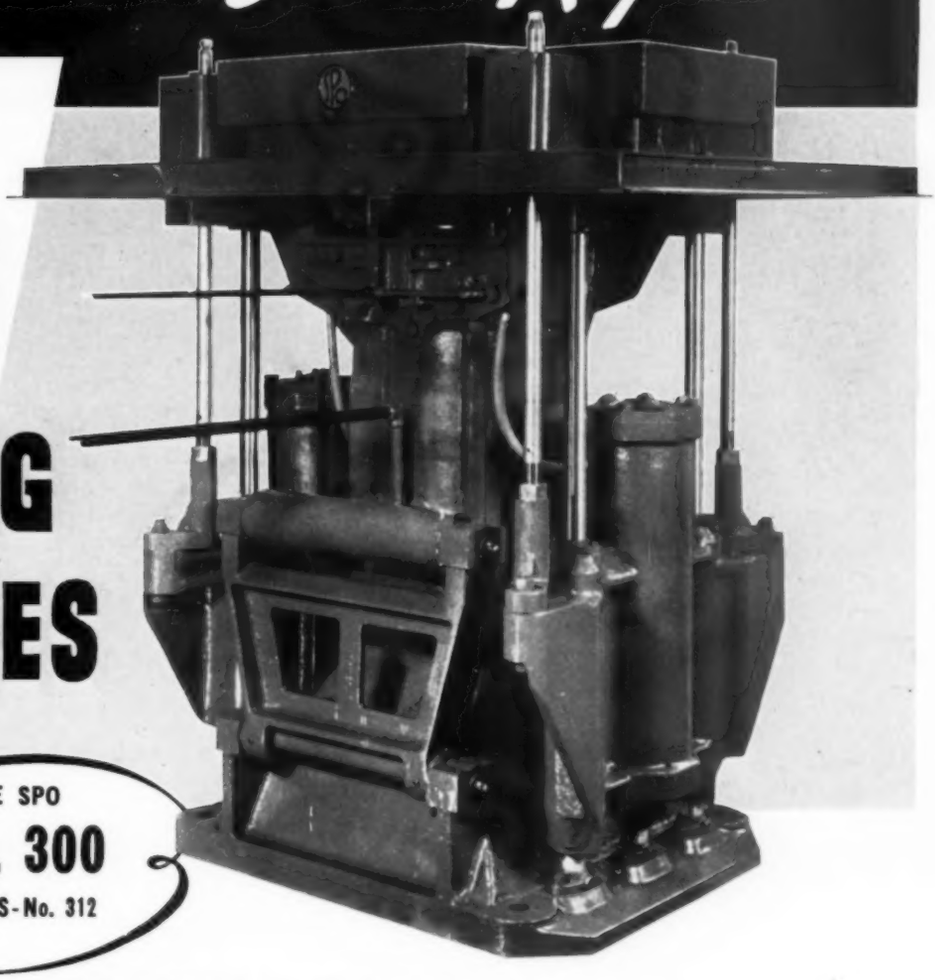
Specifications for Steel Castings

Bureau of Ships, Navy Department, Washington, has issued ad interim specification 49S1 for steel castings dated Feb. 1, 1942 which supersedes that issued in July 1941. A number of changes have been incorporated including the elimination of class D castings for which class B will be supplied.

Federal specification QQ-S-681b issued Nov. 6, 1941 supersedes QQ-S-681a for steel castings which was issued July 24, 1936. It covers 14 types of steel for castings for government use except for the Navy which is covered in the previously mentioned ad interim specification 49S1.

Do it Fast.. Do it Right

WITH SPO MOLDING MACHINES



THE SPO
NO. 300
SERIES-No. 312

ACCURACY THROUGHOUT A LONG DRAW

Have you a job that calls for extra long, smooth, accurate draw? Then by all means consider the SPO No. 312. It has a drawing range of 26" and is extremely accurate all the way, enabling you to draw your patterns with a minimum of draft.

This machine is a "husky". It develops the powerful jolt blow necessary for packing deep molds. That fact, together with its long, accurate draw, adapts it particularly to the needs of steel foundries, where deep molds have to be packed hard. Simple construction leaves few moving parts to cause trouble.

The No. 312 is unusually compact, conserving your floor space. It is fully protected against sand. And you have plenty of speed to cope with today's exceptional conditions.

The SPO engineering staff offers you a wide practical experience gained as foundrymen. They will be glad to fit the SPO No. 312 or any other machine in a complete line of modern, efficient molding equipment into your program.

SPO builds both molding machines and pattern equipment, and guarantees every job to be in full accordance with your specifications.

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Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

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the adventures of Bill

BY PAT DWYER

Drawings By PUCHEY

WHAT with the war and the foundry convention and one thing or another including, drafts, taxes, priorities, allocations and a shortage of sugar and other necessities of a normal care free existence, I suppose one should not be astonished or surprised at any new manifestation, animal, vegetable or mineral. Resistance, or perhaps a better term is resignation, to a series of events or minor and major afflictions over the past year had led me to the happy conclusion that I was shock proof. If necessary or possible I felt in position to deal a few cards to Scott's doughty warrior James Fitzjames with his back against a cliff while waiting for Black Roderick to have at him with a claymore, or cheerfully to rip him open from head to tail with a skean dhu, snatched from the galligaskins.

" 'Come one, come all,' Mr. Fitzjames remarked in a loud, firm voice, the while swinging his trusty Toledo (Spain, not Ohio) blade into the correct attitude for offence or defense. 'Come one, come all,' he says. "This rock shall fly from its firm base as soon as I!"

On a certain occasion many years ago I asked Bill's opinion on this polite, but withall firm declaration of principle. He doubted the story.

"All my eye," according to this worthy citizen. "I think I know as much about fighting men and fighting language as brave Wally Scott or any other of these here now old time romantic word slingers. What Jimmy probably said—with necessary grace notes omitted—was 'Rod, ye black scut, if ye dare to lift a hand, I'll just naturally hack you into four equal parts. I'll have yer liver and lights for me supper tonight, and yer gizzard for a lavallier in the morning.' "

I pointed out to Bill that Mr. Scott was handicapped to the extent that he had to cover the subject in a manner that would bring the last words in rhyme at the end of each pair of lines. Something like a molder faced with the problem of making a three part green sand job in a two part flask.

"Even so," said bill, "he could have injected a little more life into that rock scene. Instead of the high falutin, 'Come one, come all, this rock shall fly from its firm base as soon as I', why could he not have said, 'Come one, come all do your stuff. I am the lad to call your bluff!' He might have put it another way. 'You and your scaly gang give me a pain in the neck. You might just as well try to push this rock around, by heck!' "

The foregoing digression carried me off the beam farther than I had expected. What I started to say was that under present conditions I was prepared to meet any emergency without showing surprise or astonishment. I am glad now that I did not go around boasting of this immunity. Reminds me of the sage advice of my old uncle Malachi.

" 'Keep yer loose trap av a mouth shut,' this kindly and benevolent old patriarch admonished me on many an occasion, 'an' ye won't have to back up an' choke when some wan pushes a mess av yer idle words at ye.' "

Whatever measure of resistance I had built up completely was swept away the other night when Bill mounted on a bright red bicycle pedalled up the street and turned in to the drive way. He nonchalantly dismounted and fastened the vehicle to a water spout with a 2-foot length of heavy steel chain and a padlock. He climbed up the steps to where I was sitting, borrowed a pipe full of tobacco and deliberately said nothing. I thought at first I could sit him out at this game, but finally had to yield. With what I considered a fine imitation of lack of interest I pointed the stem of my pipe at the red curiosity and said, "What's this? Turning back the clock?"

"Oh," said Bill with a fine show of indifference, "you mean the bicycle?"

"Certainly the bicycle. What do you think I meant, your grandmother's roller skates? What, when, why, how and all the rest of that stuff. Dash it all man, can't you supply a little first aid to a man slowly expiring from shock and curiosity?"

"Well," said Bill, "I'll tell you. A few months ago I got thinking that in a short time the tires on my car would give up the ghost and leave me stranded some where up Salt Creek without a paddle. According to all accounts I could not buy a tire for love or money, even if I was dripping with one and jingling with the other."

"I have my own opinion about the drip," I said, "but as for the jingling, you would not be any help to an orchestra after Mr. Morgenthau had run the fine tooth comb over you."

"No need for twisting the poisoned knife around in the wound. Let's talk about something more pleasant, to wit my elegant new red bicycle. For a start I went into a store out here on the avenue where they sell everything from mouse traps to complete furnishing for the home, you know, 'You ketch the girl. We'll do the rest.' I rambled down to the bicycle department where a very civil young fellow indicated he would be very pleased to put one of the things under me and send me away rejoicing. The prices simply

(*Continued on page* 83)

Mr. Scott would not like this

AMERICAN MONORAIL
EQUIPMENT

Helps Conserve Energy and Increases Efficiency

AMERICAN MONORAIL Overhead Handling Systems play a vital part in speeding up production in hundreds of plants working on war materials.

American MonoRail Equipment relieves men from lifting and carrying and enables them to give full time to production—keeps materials and products on scheduled routes, without congestion, delay and damage in transit.

American MonoRail Equipment is engineered to meet the particular requirements of each problem. Supplied for manual, electric, or automatic operation. There is no delay or shutdown during installation. Let an American MonoRail Engineer show you how it can be done in your plant.

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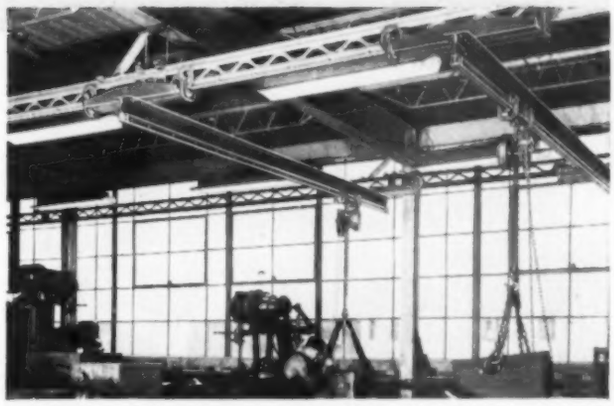

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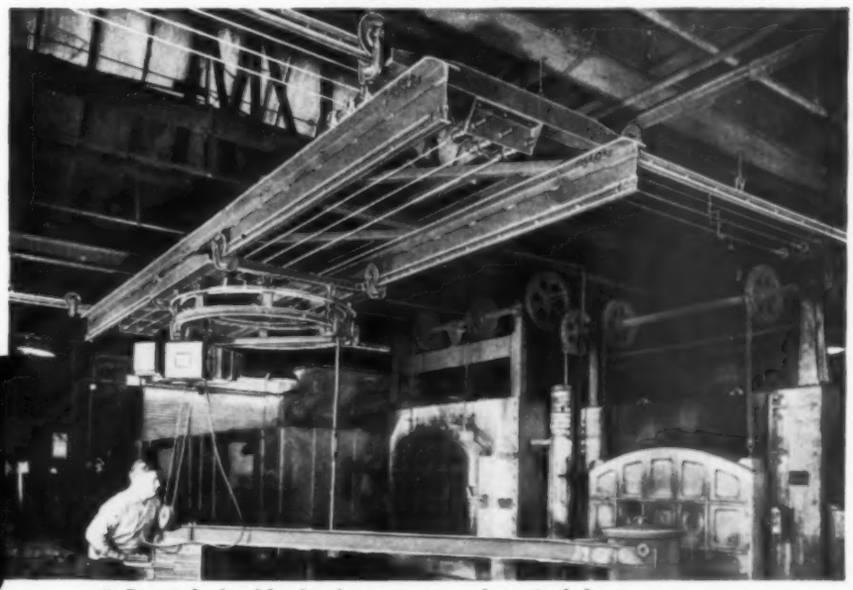

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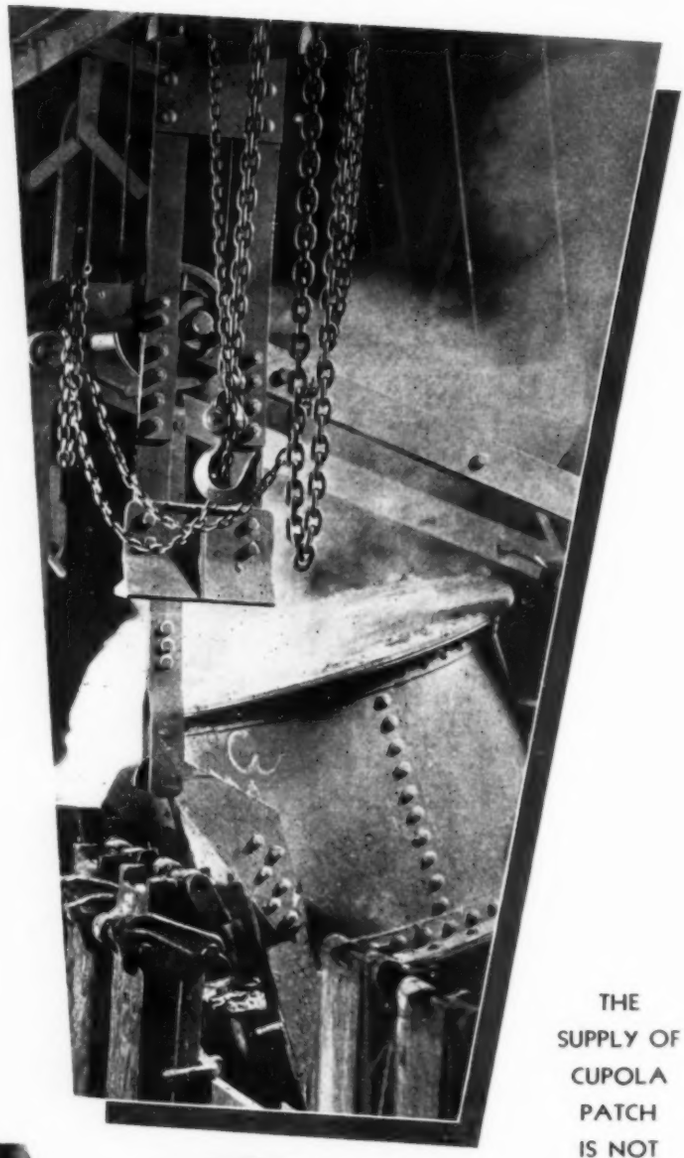
Because Cupola Patch resists erosion at high temperatures, maximum current input can be used without adversely affecting the power factor.

Furnaces may, therefore, be forced. This means melting more pounds of metal per hour while maintaining efficient slot dimensions.

Composed of electrically fused aluminum oxide crystals, the dense impermeable structure of this refractory retards penetration of metallic vapors, oxides and slags. It is metallurgically neutral and can be used as a general purpose lining.

Cupola Patch is particularly successful in melting pure copper, cupro nickel and rich alloys, as well as the common yellow and red brasses.

Electro's ceramic engineers are available for field service. They will gladly recommend correct procedure for securing improved refractory performance in vertical ring induction furnaces.



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GENERAL OFFICES: ANDREWS BUILDING, BUFFALO, N. Y.

Manufacturers of Crucibles, Alloys, Stoppers, Refractories, Grinding Wheels

(*Continued from page* 80)

were amazing. In my old bicycle days, the price range was around $100 or about the equivalent of two months wages. Took a man about 2 years to pay for one. Apparently the young blades in those days managed to hurdle the financial hurdles in the same mysterious manner their descendants of the present generation manage to acquire automobiles.

"I turned down the more elaborate models with gear shifts, sirens, bells, spot lights, hydraulic brakes and wolf tails and selected the modest model you see there anchored temporarily to the water spout. Of course," he hastened to add, "this here anchoring is no reflection on your honesty—well no serious reflection—but I want to get in the habit, the same as taking the key out of the ignition and locking the door on a car.

"After I had arranged the modest financial details and taken possession, I wheeled the thing out to the parking lot back of the store for a preliminary canter. I had not ridden a bicycle since—well lemme see—I think my last ride was with Archie Louden one day in the summer of '98 when we scorched around the Grand Boulevard in Detroit and away out Woodward Ave., as far as the Log Cabin. I wish I had a picture of that Paul Revere performance, both of us humped over on a tandem bike, caps pulled low over the eyes and coat tails streaming out in the breeze.

"In this present instance I was wearing a long over coat and the tail did not flow out gracefully behind. Not at all. The tail hung down and got tangled in the gears and very neatly pulled me back over the seat. On the next attempt I tucked the tail under me and bravely pedalled out into the rush of traffic on the avenue to the great amusement of street car and automobile passengers. At the first light I ran into the car ahead of me and the driver behind ran into me. We enjoyed a few words of fairly rapid biographical data and I snailed along beside the curb for another couple of miles.

"Covered with sweat, out of breath and with every muscle screeching with pain, I turned up a side street where a mob of little boys and girls ran alongside me and in their cute little childish manner commented insultingly on my clothing, personal appearance and riding technique. One lady on the sidewalk remarked to another that they should not allow old wabbly men like that old wreck out there to ride bicycles. He would look better in her well considered opinion, riding in a wheel chair.

"Other playful young hellions mounted on bicycles darted before, behind and all around me in graceful curves like so many swallows on a dewey summer eve, or these here now dolphins and porpoises that frequently play around a ship at sea. The light and airy gambols of these obnoxious young cubs, floating apparently without effort, contrasted painfully with my gasping and painful effort making about the same speed as a water logged derelict coming in with the tide.

"Seems to me when I was a kid I heard or read an old Biblical story of a band of similar young cubs who pestered a very civil old gent named Eli something or other, peacefully minding his own business, although as I remember the precise nature of his business was not stated. Propheteering probably or profiteering or something like that I suppose.

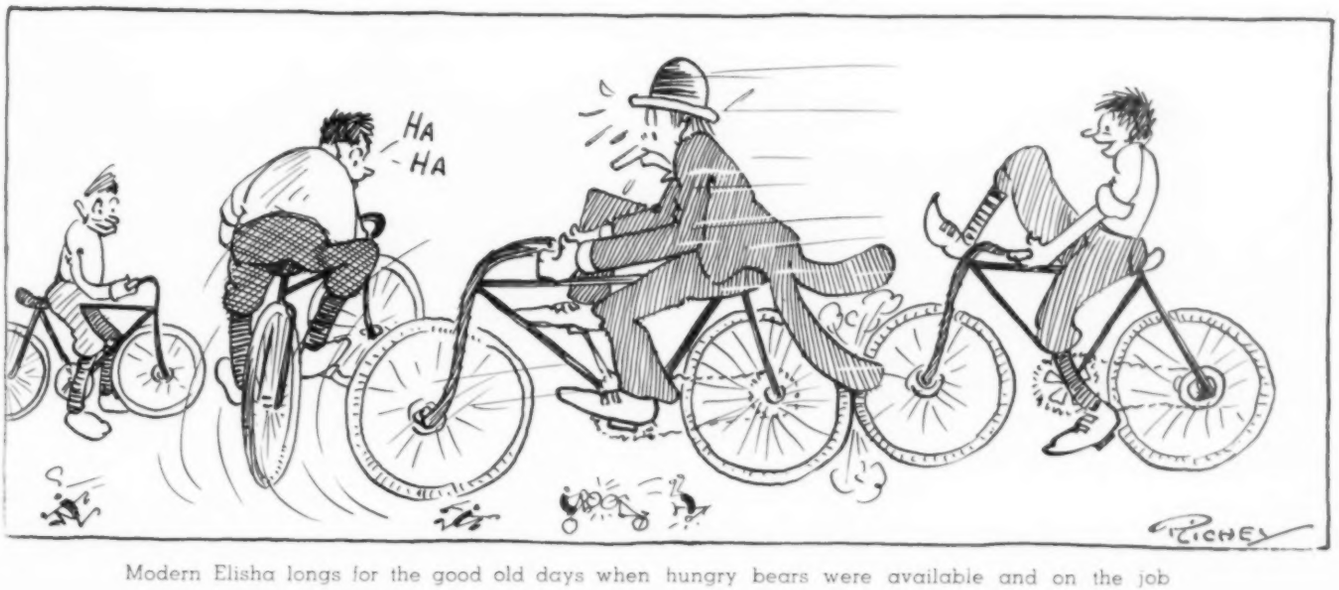
"You know me, a quiet, peaceful and noncarnivorous kind of a guy under ordinary conditions. If I had been present on that memorable occasion, I would have stood with my hands in my pockets and given three hearty cheers when the bears at old Eli's call came out of the woods, fell on the kids with tooth and nail and swallowed them body and bones. Truly a grand, a glorious and highly satisfactory and comforting performance. I must remember and throw an extra bag of peanuts to the descendants of these noble animals next time I visit the zoo.

"For a final payoff, after walking a mile, I mounted the wheel at the corner of my street dashed around the corner of the apartment and ran over the janitor. I never knew before he had such a command of language. Away ahead of anything I ever heard in the foundry.

"Talking about the foundry reminds me of an inquiry I had recently from a lad who was in doubt about tackling a casting somewhat different from his usual run of work. A job of that kind has many features in common with the experience and feeling of a young lad just out of his time in a small shop, when he takes a job in a big shop where some of the castings weigh more than a month's output in the old joint.

"The letter head in this particular case indicated that the present output of castings was for a section of the farming industry. He wrote that he would appreciate my opinion on the best molding and gating method for a cast iron die 17½ inches in length 8 inches diameter at small end, 9½ inches diameter at large end with an opening in the center tapering from 6 inches diameter at the small end to 5¾ inches at the large end of the casting. The die is to be used on hot drawn work

(*Concluded on page* 130)



Modern Elisha longs for the good old days when hungry bears were available and on the job

A·F·A CONVENTION

(*Continued from page* 65)

strength, etc., and how car gases can be reduced.

Final lecture on core practice was held Friday afternoon with Russell F. Lincoln, Osborn Mfg. Co., Cleveland, as chairman. Mr. Dietert discussed casting surface as affected by core sand mixtures and defects caused by faulty cores. Properties of cores which affect casting surface include stickiness of mixtures, pressure used in placing sand in core box, strength of the core, types of sand used in the core, and silica flour.

Defects caused by faulty cores include a wide variety such as metal penetration, fissures, blowing, loose sand, shifting, buckling, scabbing, peeling, hot tears, and core wash.

First session of the gray iron shop course opened Tuesday morning with an excellent attendance. W. S. Linnell, Wisconsin Steel Co., Chicago, presided, and the discussion leader was George Timmons, Climax Molybdenum Co., Detroit, who spoke on the practical theory of shrinkage. Mr. Timmons pointed out that shrinkage, as usually encountered in foundry conversation, might mean volume change or contraction, and a type of defect which also is called porosity, sponginess, draw, etc.

The latter type of shrinkage was the one to be discussed. Lack of feeding results in voids which may be overcome by use of risers, provided they are attached so that they are last to freeze. Other factors influencing the formation of voids or porosity include change of density of the iron as it cools from pouring temperature to a solid; eutectic temperature of the iron composition, and the temperature at which solidification normally begins, and the temperature gradients within the casting.

To illustrate his remarks slides were shown of an investigation performed with a 4-inch cube made in dry sand without feeding, using a synthetic base iron in which all but one variable were controlled. Results obtained indicate that shrinkage voids may be controlled or eliminated by reducing elements, such as phosphorus, which tend to increase the freezing range; reduction of pouring temperature to obtain uniform freezing through decrease in temperature gradients; gating through light sections and risers; proper control of pouring rates, and use of chills.

Discuss Permanent Molds

Permanent mold practice was discussed before a lively session Wednesday morning in which a score of foundrymen of the 300 present participated with questions and answers, the speaker being Kenneth Priestley, Eaton-Erb Foundry division, Eaton Mfg. Co., Vassar, Mich. After briefly tracing the history of the permanent mold, through several failures due to vain efforts to find a satisfactory refractory coating for the face of the mold, he pointed out the progress which since has been made.

Malleable and steel castings can be produced in permanent molds as well as gray iron castings. The secret lies in the effectiveness of the face coatings made of high-grade pipe clay (alumina) and sodium silicate, acetylene soot being used between casts. Life of the mold depends upon size of castings. Steel foundries are using silica hot-tops such as on ingot molds to avoid piping. This permanent mold session was presided over by R. F. Hine, head metallurgist, foundry division of Studebaker Corp., South Bend, Ind.

At the Thursday morning gray iron shop course, John Lowe, Battelle Memorial Institute, Columbus, served as discussion leader on the subject "Shrinkage in Pressure Castings." He pointed out that the salient points of practice in producing these castings weighing from 1000 to 2000 pounds include: Hot iron, rigid dry sand molds, permeable sand, high steel content in cupola charge, high heads and proper gates. A member of the audience asked what can be done to avoid trouble from free graphite when melting high carbon iron. Another member volunteered the information that where the amount of free or graphitic carbon is too great it is impossible to pour the iron at any speed to insure a solid casting. Proper melting practice is essential to secure the proper balance between the amounts of combined and free carbon in the iron. The metal must not be superheated, and it must not remain any longer than absolutely necessary in contact with the coke in the well of the cupola.

In starting out the fourth section of the gray iron shop course Friday morning, Elmer J. Carmody, C. C. Kawin Co., Chicago, indicated his experience showed theories do not always work and that it is better to deal with cause and effect. He emphasized that in production of large castings, it is valuable to have everyone concerned meet for a group discussion of all factors involved, especially shrinkage, for so

(*Continued on page* 86)

Photos courtesy John Bing, A. P. Green Fire Brick Co., Milwaukee

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(*Continued from page* 84)

many things affect it, particularly heading and gating.

He described a case where voids from shrinkage as the metal passed the solidification point resulted in reducing the strength of a casting from a minimum of 30,000 pounds per square inch down to a value of only 16,000 pounds per square inch. Addition of 1.5 per cent alloy in that lot of castings was wasted because subsequently good solid castings were produced in metal with no alloy at all, merely by use of proper heading methods which he proceeded to describe.

Principal causes of shrinkage were broken down into main classifications to include: Poor design; improper patterns, flask equipment, rigging; wrong molding practice; incorrect type of sand; cores not properly made; gating and risering bad; unsuitable iron composition. This was broken down into defects resulting from carbon-silicon ratio out of balance, combined carbon too high, alloy content too high; over-inoculated with graphitizers; deviations from right cupola practice. These in turn were listed as: Improper blast pressure or air volume; too high a coke bed, affecting carbon pickup; variations in blast, allowing excessive carbon pickup; too long a tapping interval; variation in size of materials charged; excessive heat; improper pouring temperature.

MORE TRAINED MEN

Needed by Foundry Industry

APPRENTICE training session was held Tuesday morning with James G. Goldie, Cleveland Trade School, Cleveland, as chairman and Dean C. J. Freund, University of Detroit, Detroit, as co-chairman. Donald F. Lane, who is in charge of apprentice training at the Sparrows Point, Md., plant of Bethlehem Steel Corp., presented a paper entitled, "Foundry Apprenticeship, Now, How and Why." Mr. Lane pointed out that the need for apprentice training now is greater than ever before with the greater demand for skilled men to meet the heavy production requirements of the war effort. He described how young men, generally between 18 and 20 years of age, are chosen for apprentice training at Bethlehem. All are required to take an examination which those with high school training usually are able to pass. He said that approximately 12 per cent of their apprentices have had a year of college and a few have had 2 years.

Take Additional Work

In addition to the class work provided in the apprentice courses, many of the boys are taking additional college work. Mr. Lane went on to say that the foundry apprentice course given at Bethlehem is a 4-year course and is not designed to train molders and coremakers, but rather skilled mechanics and men capable of advancing to supervisory positions in the company. In addition to the shop work which covers all phases of molding, with some laboratory practice and office routine in addition, the training course provides four hours a week class room instruction in blue print reading, mechanical drawing, mathematics, metallurgy, foundry practice, and industrial economics and supervision.

In the question and answer period which followed, Mr. Lane stated that Bethlehem has no trouble in obtaining men for its apprentice courses. He felt that the attractive starting wage was one factor and another was the fact that they are able to point to several foremen, supervisors, and assistant superintendents in the plant who have come up through the ranks as apprentices.

Second half of the meeting was devoted to a question box discussion on the "Training Within Industry" program of the War Production Board. Discussion leader was O. F. Carpenter, associate district representative of Training Within Industry, Detroit. Mr. Carpenter, in describing the program, stated that the United States is divided into 22 districts, each with its own staff to administer the program in that district. Latest information and methods developed in each section is available to all districts. Services of the district offices are available to all plants wishing to use the training program, and all participation is voluntary.

In reply to the question, how can training within industry upgrade foundry workers, Mr. Carpenter pointed out that men taken from the ranks in the plant are given a short, intensive course in job instructor training, which consists of about 10 hours. These men then can be placed in subforemanship or foremanship positions and less skilled workers may be brought in to fill the ranks. The instructors for the training within industry courses are provided by that division of the War Production Board. Mr. Carpenter emphasized the point that the program is in no way a replacement of apprentice training, but rather a short, intensive training program for upgrading present single process operators in plants.

Importance of foreman training and methods of teaching foremen to instruct their workers were discussed at a dinner meeting of the foreman training group, presided over by Wally E. George, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.

V. J. Swanson, Tractor Works, International Harvester Co., Chicago, took exception to the charge that a foremen's conference is nothing more than a gathering to talk about work the foremen should be doing at that time out in the shop. He emphasized, however, the necessity of having a capable leader for these conferences. Such meetings at the International Harvester plant last 2 hours, with the first 30 minutes devoted to a discussion of current events. This discussion is regarded as valuable in giving the foremen facts with which to answer false rumors circulating among men in the shop.

Mr. Swanson pointed out that war production requires the foremen to work harder and experience sacrifices and inconveniences and at the same time he is expected to inspire confidence in the workers. Consequently the foreman is entitled to the best training assistance to help him carry out his job.

Should Teach Foremen

If foremen are expected to teach workers, the former must be taught how to teach, William Odom of William Odom Associates, Chicago, declared. In outlining a plan for proper teaching, the first step is to find out what it is the man needs in order to do his job properly, he stated. The job should be analyzed from the standpoints of physical and mental effort, skill required and responsibility involved. These requirements, when measured against the mechanical and mental abilities the proper training prescription by and physical and social characteristics of the worker, will point to showing up what deficiencies exist.

These deficiencies should be arranged in their order of training difficulties, with the easiest receiving first attention. The teaching technique should follow this sequence: Preparation; demonstration; application (permitting the worker to perform the operation himself); and examination.

Relatively few students being graduated from our engineering colleges and universities consider making their career in the foundry industry, principally because they have not received sufficient information to give it consideration. This is one of the conclusions reached as a result of a survey conducted by

(*Continued on page* 88)

The CORE OIL DOCTOR

Devoted to new ideas and case study reports on core room practice

Published Monthly, Volume 1, Number 3, June 1942

If you didn't get to the Foundry Show or if you were there but were too busy to come in and say "hello," we'll forgive you although we're both losers in the latter case for we had lots to tell you about our new plant and greatly increased production facilities, our 350,000 gal. storage capacity, our six new high speed kettles, our modern laboratory and the testing facilities we've set up so that we can give you *all* the facts on what our core oil will do, how to better your present mixes, baking time and almost any other question you might ask regarding core oils and core production in general.

Nevertheless, these facilities are at your disposal and if we can help you in any way to increase your core production, speed up baking time, reduce "shake-out" time and cleaning costs, feel perfectly free to write us asking for the suggestions of our experienced core oil engineers. Our job is that of doing one thing well—making the right grade of uniform and dependable core oil regardless of type of metal or the kind of sand used or oven heat employed. We'd like to help you—won't you drop us a line?

A group of "armament part" cores made with Certified Core Oil according to the Core Oil Doctor's Formula.

A view of our booth at the Cleveland Show where lots of core troubles were diagnosed for the benefit of foundrymen from all over the country.

Questions and Answers

Question: We would appreciate your suggestions on how to definitely locate the cause of our cores not baking uniformly. We make our own core oil from the materials stated.

Answer: The following are the major sources of trouble when cores do not bake uniformly. *All* six points should be carefully checked as there may be more than one cause for the trouble you are having.

(1) Be sure the correct amount of materials are put in the mixer and if the sand is stored in the open and is extremely wet, it should be tempered with dry sand to bring the final mixture to the correct moisture content.

(2) Test each car of sand for clay content, size of grain and fines, as clay (which is a notorious oil eater) lowers permeability, as do smaller sand grains and fines. A carload of sand makes a lot of cores and it is well worth the little time it takes to test it thoroughly.

(3) Coke, although it may look the same, can vary tremendously in heat giving properties (B.T.U.). The simplest way to detect any such variance is to closely watch baking results when beginning to use a new supply.

(4) Be sure to use your core oil by weight—not by measure.

(5) The materials you blend as a core oil should not vary sufficiently to be a cause for cores not baking uniformly but if you will forward us a 4 oz. sample and 5 lbs. of your core sand and state the sand to oil ratio, we will test it (without obligation) and furnish you a chart showing the tensile strength of cores, at 15 minute intervals of baking time. We will use your sand in the test if a sample is furnished; otherwise, we will use washed silica sand of 50 mesh fineness.

(6) *Very important is the condition of your oven*, and we suggest you look up our advertisement in last month's issue of "The Foundry" in which we outlined a plan on how to distribute and circulate heat evenly in old type ovens and at very little expense.

Maybe you have developed a special core room practice that will save some other foundry lots of time and money. If you have, tell us about it so that we can pass the good word along to other core room superintendents who read this column.

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(*Continued from page* 86)

Dean C. J. Freund, University of Detroit, and reported at the Wednesday evening session on The Foundry Industry and Engineering Training." Fred G. Sefing, International Nickel Co., New York, presided.

The survey was made by interviewing nearly 200 senior engineering students of several Midwestern schools. While lack of information was the outstanding reason why approximately 80 per cent of the group had not considered a career in the foundry industry, there were numerous other reasons. Some felt that the industry required more practical experience than other fields; or that foundry instruction in schools is more in the nature of a laboratory course than an introduction to a career; or that the foundry industry had insufficient regard for modern methods. In many instances the students stated they simply were not interested.

A significant result of the survey was the statement by about 35 per cent of those interviewed that they knew less about the opportunities and requirements of the foundry industry than of other major industries.

Dean Freund indicated that the foundries are responsible for this lack of interest on the part of the engineering graduates, pointing out that the plants make little if any

(*Concluded on page* 91)

Photos of individuals, courtesy of Bradley Booth, Jackson Iron & Steel Co., Jackson, O.

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Foundries of America, fighting against time in the battle for more production now, find Sterling Flasks soundly engineered for the super-speed and endurance so vital in these 24-hour work-days! Over 3500 foundries know the value of Sterling reinforced, all-welded construction . . . hardened steel bushings . . . clamps and clamping lugs . . . trunnions, loop or lift handles . . . steel flask bars, core plates, steel bottom boards, upsets, skim gates, shop and sprue boxes . . . complete Sterling foundry flask service.

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Minute additions of this relatively abundant element, to steels and irons, yield properties otherwise obtained only by use of scarcer imported materials. One specific advantage in many cases is deep penetration of hardening effects, accompanied by an increase of yield and ultimate strength.

Researches on Boron have been conducted for some time by the Molybdenum Corporation of America and more recently verified under a fellowship at a leading university. A patent for the effective incorporation of Boron in irons and steels has been secured and its results will be made available to any American manufacturer. Inquiries are welcomed.

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(*Concluded from page* 88)

attempt to interview and interest students in becoming associated with the industry. In contrast, many companies in other fields regularly comb the engineering schools each year for the more capable men. He stated that there is an opportunity for engineering graduates to help reduce foundry practice to more of a science than it is today in departments other than melting. Simplification and standardization of production methods would remove the long waiting period now necessary for the beginner to acquire sufficient practical experience and would eliminate one of the objections to a career in the industry.

American Cast Iron Pipe Co., Birmingham, has a comprehensive plan for training young engineering graduates and other workers. As outlined in a paper by S. D. Moxley and presented by Thomas Barr, both of that company, the two to three-year course seeks to enlist promising students of southern engineering schools but is not limited to such individuals. Those enrolled are given experience in the production, metallurgical, research, personnel, sales and maintenance departments and eventually are placed permanently in the branch to which they seem best suited. The company also makes a practice of employing undergraduates during the summer, thereby creating interest in permanent jobs upon graduation.

Students studying advanced work in foundry practice have increased in number more rapidly the past few years than has the number of students receiving all types of foundry instructions in engineering schools, according to results of a survey presented by Prof. Peter Kyle, Massachusetts Institute of Technology. Of 55 schools from whom reports were received, 35 are conducting some sort of foundry practice course. Most of them have one instructor for such work, there being 61 foundry instructors at the 35 schools, and the courses generally are supervised by the mechanical engineering schools of these colleges and universities. On the average the courses consist of a one-hour lecture and a two-hour laboratory period per week. Total number of students studying foundry practice increased from 5597 in 1938-39 to 5880 in 1940-41, while the advanced course number rose from 457 to 571.

The annual informal dinner for engineering foundry instructors was held at Hotel Statler prior to the engineering training session Wednesday evening.

PATTERNMAKERS COVER

Wide Variety of Topics

TWO short extemporaneous talks and one paper on core boxes for core blowing were presented before an audience that packed the Lattice room of Cleveland's Statler hotel at the initial evening session of the American Foundrymen's convention Monday.

The speakers, who were introduced by Frank C. Cech of the Cleveland Trade school and chairman of the session, including O. A. Van Sickle, City Pattern Works, Detroit; R. F. Lincoln, Osborn Mfg. Co., Cleveland; and A. K. Laukel, Electro-Chemical Pattern & Mfg. Co., Detroit. Both Mr. Van Sickle and Mr. Laukel delivered short extemporaneous talks, the only paper being presented by Mr. Lincoln.

Highlight of the evening, however, was an impromptu chalk-talk presented by a member of the audience, M. J. Gregory, foundry superintendent, Caterpillar Tractor Co., Peoria, Ill., which was the culmination of Mr. Van Sickel's discussion on the "Design of Core Boxes and Driers for Core Blowing."

According to Mr. Gregory, the subject of blowing is especially important today. He said that one of the mistakes being made by foundrymen is to see how few holes could be put in the box. Another, he stated, was the use of too high an air presssure in blowing the sand through the core.

Mr. Gregory then proceeded to show the audience what was being done at Caterpillar, by means of sketches. While at the blackboard he declared that the best practice in blowing is to put plenty of holes in the core box, and showed what he meant.

In answer to a question, he illustrated how his company vents the air that goes up after it hits the bottom of the core. He also drew a sketch showing how 1000 cores can be blown with one core box—by simply making sand go around a corner.

In his paper on "Equipment for Blowing Holes," Mr. Lincoln discussed the basic principles involved in connection with the construction of core boxes for, and blowing of, the core blowing machines.

With the aid of slides, he reviewed the operation of the core blower as a whole, discussed air pressures and pointed out reasons for the desirability of having tight seals and joints in core boxes. Mr. Lincoln, in his paper, gave special attention to the general layout and arrangement of the core in the box, and with the slides demonstrated the five factors that must be kept in mind in positioning a core to be blown.

Mr. Laukel, in giving his talk on the "Production of Copper Patterns by Electro-Forming" pointed out that this method of producing patterns is extremely accurate, and only can be used to produce "patterns that are splits."

Shortage of metals, particularly aluminum alloys has increased the difficulties in producing suitable pattern equipment and an interesting session held on Tuesday afternoon under the direction of E. J. Brady, Western Foundry Co., Chicago, discussed some remedies. George Dreher, Ampco Metal Inc., Milwaukee, described some results obtained with a plastic type coating which applied to wood and metal gave a finish comparable to that obtained on aluminum. So far the experience had not been sufficient to determine the life of the coating, but it appeared satisfactory.

Applied by Spraying

Special equipment is required for applying the material by spraying on three coats about 0.003-in. thick. Between coats the material is treated with a solvent. About two days are required for the operation, and the cost at present is about $5 a square foot, but final result with wood patterns is a cost around one-half to two-thirds that of a metal pattern.

J. E. Crown, U. S. Naval Gun Factory, Washington, spoke briefly on his experience with a liquid rubber coating on patterns and core boxes which eliminated considerable trouble with stick downs on humid days. The material wore well, but due to the extreme shortage of rubber that has developed, he did not think it likely that the material would be available for general use.

E. T. Kindt, Kindt-Collins Co., Cleveland, spoke on specifications for foundry and pattern lumber. Three types of wood most generally employed are northern white, Idaho and sugar pine, although mahogany is used to some extent also. The pine woods are reasonably light in weight and are worked easily. In his opinion water cured lumber—that is trees are allowed to soak in water for a period after cutting—give a better lumber than that not subjected to such curing. Grades of lumber are based on a number of factors including knots, shakes, mineral spots, etc., and the two most commonly used grades are select and common. He explained the characteristics of each with its several subdivisions.

George Gedeon, Aluminum Co. of America, Cleveland, and Frank Cech,

Cleveland Trade School Cleveland, collaborated on a paper entitled, "Driers and Green Topping Cores," which was presented by Mr. Gedeon. The paper described the methods employed in producing both aluminum alloy and sand driers for cores, using master plaster patterns. The sand driers were found to be quite suitable for short runs, and could be stored and used as occasion demanded.

The paper also described the use of green topping cores wherein one half of the core is baked, and then the other half made in green sand. In many instances considerable time was saved by that procedure.

STEEL FOUNDERS STUDY

Ways To Improve Quality

HIGH tide of interest in steel castings and modern technique for improving their quality was reflected by a keenly responsive capacity audience at the steel session held on Wednesday afternoon, April 22.

Conduct of this meeting was shared by F. A. Melmoth, Detroit Steel Casting Co., Detroit, chairman, and K. V. Wheeler, American Steel Castings Co., Newark, N. J., co-chairman. Both contributed materially to the interest of the session through their own contributions to the discussion and by encouraging discussion and questions on the part of the audience.

This entire session had a distinct naval flavor, inasmuch as all four of the contributors are connected with the Navy department. The first paper entitled, "Atmospheric Pressure and the Steel Casting—a New Technique of Gating and Risering" was prepared by H. F. Taylor and E. A. Rominski, Division of Physical Metallurgy, Naval Research Laboratory, Washington, and was presented by Mr. Taylor with the help of a large number of slides. It was concerned in the main with the use of so-called blind risers or shrink heads in the making of steel castings which are free from internal flaws or external distortion due to improper feeding of the interior of the casting as it cools externally.

Experiments by the authors indicate that as a steel casting lies in the mold, three stages of volume change occur. First, there is a liquid contraction of 1.6 per cent per 100 degrees Cent. Next there is solidifying contraction of 3 per cent. Finally there is contraction in the solid state of 7.2 per cent. This corresponds to the findings of Briggs and Gezelius, using 0.35 per cent carbon steel.

Photos courtesy Sterling N. Farmer, Sand Products Corp., Cleveland

As a mass of steel solidifies in the mold from exterior toward the center the tendency is either for the sides to collapse or for a pocket to form. The best way to prevent this, according to the authors' findings, is to superimpose upon the main section a dome shaped riser of generous size into which is inserted a baked core of rod shape which permits the center of this blind riser to breathe—so to speak.

In planning gates and risers it must be borne in mind that atmospheric pressure, that is, barometric effect, is a powerful influence in forcing molten metal into the mold. Inasmuch as molten steel has density somewhat less than 7.8, the theoretical height—calculated on the basis of mercury—to which normal atmospheric pressure will lift the molten steel is 52 inches.

In discussing this paper, H. D. Phillips, Lebanon Steel Foundry, Lebanon, Pa., called attention to the fact that setting of a baked core into a blind riser is a patented expedient. In large castings he advocates passing this core entirely through the riser. He also called attention to the fact that open risers will feed blind risers when both are used.

Discusses Steel Shrinkage

The other paper at this session was by S. W. Brinson, master molder, and J. A. Duma, associate metallurgist, Norfolk Navy Yard, Portsmouth, Va. Mr. Brinson abstracted the paper while Mr. Duma presented the slides and radiographs.

This paper, entitled "Studies in Centerline Shrinkage in Steel Castings", dealt with the problem—particularly important in naval pressure castings—of getting homogeneous structure throughout sections of various thicknesses.

The flaws, variously called centerline shrinkage, centerline weakness, hot metal line and center line, when viewed in one plane appear like chevrons pointing away from the feed heads. The material in the flaws is porous or "cokey" in character.

Relatively heavy padding or wedging of the sides of sections likely to be so affected is advocated by the authors. Mr. Brinson went so far as to say that he would rather machine off 20 pounds of excess metal than run the chance of having a faulty casting. "Nothing", he added, "is as expensive as a rejected casting." This should be borne in mind when removing the considerable amount of "excess metal" often required to insure sound sections in steel castings.

In commenting on this paper, C. E. Sims, supervising metallurgist, Battelle Memorial Institute, Columbus, O., rose to the defense of steel castings by saying that while this

(*Continued on page* 94)

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(*Continued from page 92*)

phenomenon of centerline shrinkage is almost inevitable in straight-sided steel castings, they have the characteristics of tubes which are extremely strong for their weight, even though hollow within. Railway side frames are good examples of that.

In closing the session, Chairman Melmoth and Co-chairman Wheeler urged that designers study both papers carefully so that they will design steel castings to take advantage of the findings of the authors in such manner that causes of flaws will be eliminated by the design itself. Joint study of models by designers, patternmakers and foundry experts was advocated as a practical means toward this end.

R. H. Stone, Vesuvius Crucible Co., Swissvale, Pa., in speaking on "Steel Pouring Refractories in Foundry Practice" at the steel session, Wednesday evening, recommended a reasonable density and medium firing in the manufacture of nozzle sleeves in order to give the necessary resistance to slag. The joints between sleeves are filled with a sand loam and fire clay mud, using enough material so that it is forced into the space between the rod and sleeve.

Set Nozzle Correctly

Nozzles, he asserted, should have a coarse texture, that is, the surface of the fracture should show coarse particles but the density should be high and porosity low. In referring to the wear of nozzles and stoppers Mr. Stone stated there is less likelihood of inclusion in the steel if a constant rate of pouring is maintained than if no wash is permitted and the flow toward the end of the pour becomes slow. He directed attention to the correct setting of the nozzle explaining it is influenced by the design and condition of the ladle lining. A poor bottom lining increases the difficulty of setting the nozzle properly, he warned. It may be found necessary to increase the length of the nozzle, as the size of heats increases, in order to produce a full, nonspraying stream. If a nozzle 7 inches high is satisfactory for a 2-ton heat, then good practice may require a 10-inch nozzle for a 34 to 40-ton heat.

Mr. Stone drew attention to two essential principles in drying stopper rods, namely, that the handling and support of the rod in the dryer must be such that the joints are not loosened nor the stopper head damaged; and, the entire assembly must be moisture-free before using in the ladle. He recommended that the rigging on the ladle should be kept in first-class repair so that the stopper will be operated firmly. The undercut of the stopper head should be sufficiently deep, Mr. Stone warned, to protect the stopper bolt head and for this purpose should not be less than 1½ inches deep regardless of the size of stopper.

A paper on "The Use of the Hot Strength Test as a Tool for Controlling Core Mixtures" by F. B. Riggan, metallurgist, Key Co., East St. Louis, Ill., was presented by R. Jacoby, metallurgical department of the same company, in the absence of the author. He pointed out that certain castings were being scrapped due to a scab at the location adjacent to the gate. Different core mixtures were tried to overcome this difficulty and while more silica flour and more bond were added the trouble persisted. Even the core would crack the casting. After installing a dilatometer, he explained, it was found that the cores were too hard and that the expansion was so high that once what was possibly a scab turned out to be a buckle. The first metal that went to the gate against the core would cause the outer layer of the core to expand and buckle away. With this harder layer removed the relative softer inner core would cut away and the typical scabbing action would occur during the pouring of the latter part of the metal.

When the Caterpillar Tractor Co., Peoria, Ill., learned that one of its apprentices, Neal B. Hamilton, won first place in the gray iron division of the apprentice molding contest, which was judged at the Cleveland A.F.A. convention, the winner was sent to the convention with all expenses paid so that he might receive full recognition for his success. Mr. Hamilton is 22 years old, an apprentice in the four-year foundry course. He was born in Decatur, Iowa, attended Oskaloosa high school and studied at Iowa State College, Ames, Iowa, before becoming employed by the Caterpillar Co.

The dilatometer, he explained, disclosed that a weak core could be used for small work, of 3 to 5-pound hot strength and that by the addition of iron oxide hot strengths could be obtained as desired up to 20 pounds.

Discussion brought out the fact that iron oxide is best introduced as 200 mesh material. It was suggested that ferric chloride might be used inasmuch as it reverts to ferric oxide on baking.

Charles Briggs, Steel Founders' Society of America, Cleveland, in presenting the report of the committee of radiography announced that developments were being followed closely and that many foundries are now using radiography. He mentioned that Canadian terminology on the subject had been studied and with a few changes had been incorporated in the report as well as a list of various articles dealing with radiography. Upon motion the report was accepted as it stands.

Practice Slag Control

Steel division roundtable luncheon and discussion was held Thursday noon at Hotel Statler under the direction of R. S. Munson, Atlantic Steel Casting Co., Chester, Pa., as chairman. Subjects which were discussed informally included heading and gating of steel castings, magnetic testing, and sand testing at normal and elevated temperatures.

At the steel session Friday morning, John Juppenlatz, Lebanon Steel Foundry Co., Lebanon, Pa., presented one of the first papers written on the factors involved in viscosity slag control in acid electric steel-melting furnaces. He emphasized that slag control was not a sure method but that it was an extremely valuable approach to use as a guide in furnace operation. Especially in working carbon steels, slag control is of major importance. No attempt appears to have been made to measure slag volumes directly, most of the control being around slag viscosity, using values obtainable from a simple viscosity measuring method involving the distance the slag will flow in a standardized runner.

In starting out slag control methods, Mr. Juppenlatz related how for a long time records were simply made of slag viscosities along with other factors during the heat. Later it was found possible to correlate these slag viscosities with some of these other operating factors, thus making slag control methods of value.

It was brought out that these curves and relations obtained in his plant were applicable only to its own particular conditions. Each plant thus must first make its own correlations for use in slag-control methods, and determine what type of slag gives best results for a certain heat.

Charles W. Briggs, Steel Founders' Society of America, presented a paper prepared in conjunction with George S. Baldwin, Standard Steel

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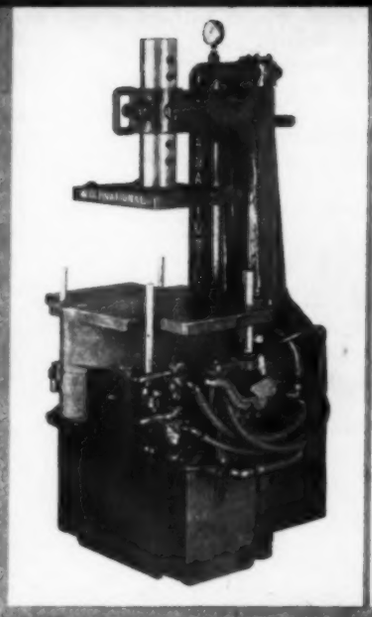
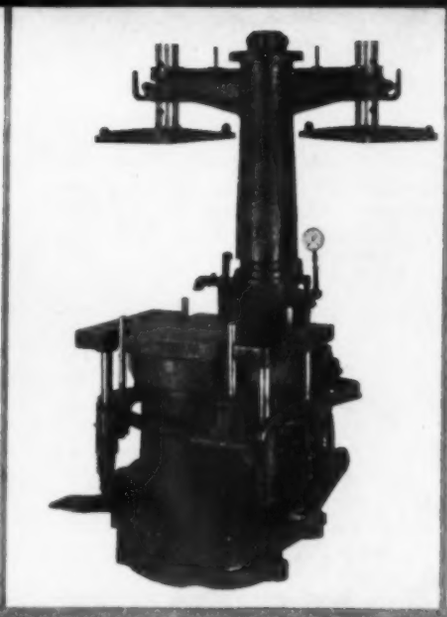
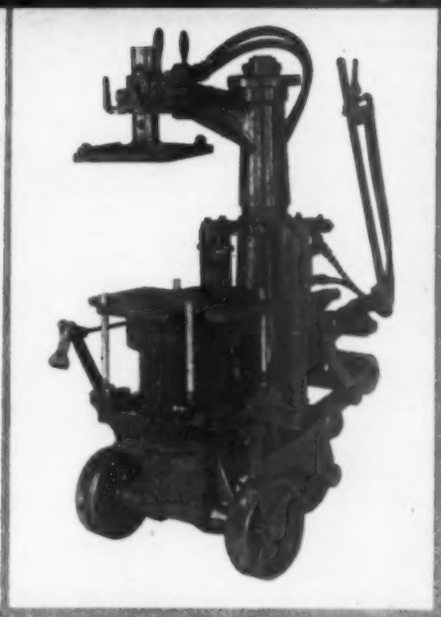
INTERNATIONAL MOLDING MACHINES







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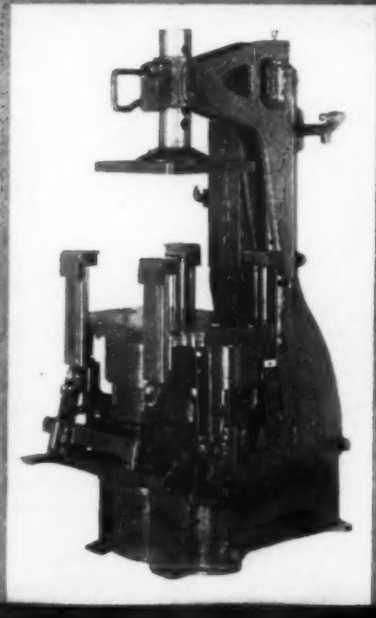

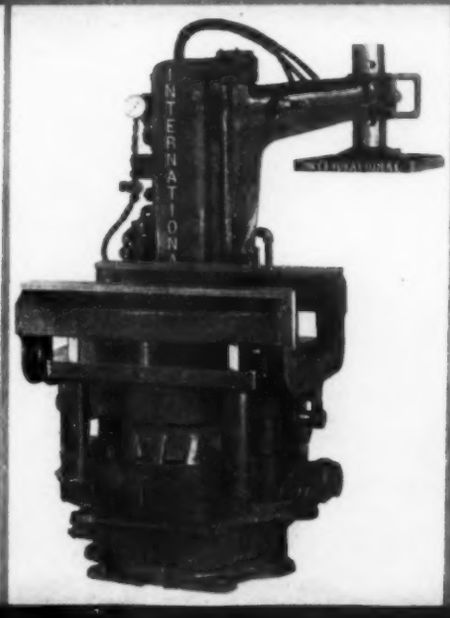

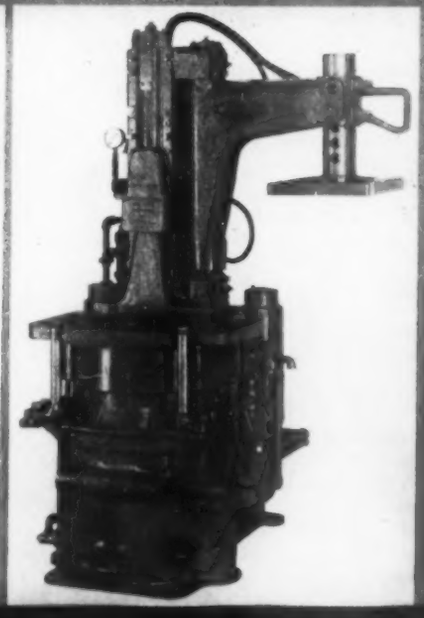

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(*Concluded from page* 94)

Works division, Baldwin Locomotive Works, Burnham, Pa., which proved to be a very complete symposium on acid open-hearth practice for steel castings. In reading the paper, he emphasized that portion relating to slag control methods, since discussion from the floor indicated considerable interest in that phase of the topic. He said the practice was to regulate the slag by adding the proper amount of calcium oxide and manganese oxide and by regulating the temperature so not too much silica is picked up from the furnace lining during the course of the heat.

In the discussion that followed, comment was made that when sulphur and phosphorus content were made too low, that the ballistic properties of steel armor plate castings fell off to an important extent. One explanation offered pointed out that this was quite in line with the common experience of a falling off in physical properties resulting from over refining during the course of the heat, the result possibly due to the effect of phosphorus and sulphur on the characteristics of the material surrounding the grains in the metal.

Making Navy Steel

The paper on making navy steel in basic electric furnaces by S. W. Brinson and F. B. Anderson, Norfolk Navy Yard, Portsmouth, Va., was devoted to the history and practices at that navy yard. Mr. Brinson, in presenting the paper, told how their products range from castings weighing only 1/16-ounce up to those weighing 8000 pounds or more. Besides making steel for castings, the electric furnaces are employed to produce all the monel metal required by the Navy, including silicon monel. Brass and other types of materials also are handled.

He described in detail the practice employed to make 15,000-pound heats in a 3-ton furnace. In order to cover the widest possible range of work, the electric furnaces are all supplied through oversize transformers, a 5000-kilovolt-ampere furnace being served by a 6000-kilovolt-ampere transformer, with a 3000-kilovolt-ampere transformer serving a 2500-kilovolt-ampere furnace. Thus an ample power supply makes it possible to melt down an over-loaded or over-charged furnace when that becomes necessary.

The English exchange paper by C. H. Kain and L. W. Sanders, Lake & Elliott, England, was devoted to a description of this plant, an excellent example of a self-contained foundry unit. Plant has its own power supply, so furnaces are scheduled to utilize all power available most efficiently. Gas is made on the premises. The plant is not mechanized; castings up to 1500 pounds are made; some induction furnaces are used for high alloy steels. Details of foundry practice were given.

Final session on steel castings was held Friday afternoon. R. A. Gezelius, General Steel Castings Corp., Eddystone, Pa., was chairman, and Henry D. Phillips, Lebanon Steel Foundry, Lebanon, Pa., was vice chairman. First speaker on the program was J. A. Westover, Dyer Engineers Inc., Buffalo, N. Y., who described grinding wheel cost control. Through an investigation the costs of grinding wheels in a steel foundry was reduced from $4.26 per ton of castings in 1937 to slightly over $3 at present. That was accomplished through selection of the proper grade and grain of wheel for the work, and grinding wheel operator control. The latter was established by using an incentive set up for wage payment.

Welding of medium carbon steel castings by the metallic arc process was described in a paper prepared by S. E. Mueller, Falk Corp., Milwaukee, A. B. Smith, American Bureau of Shipping, Chicago, and J. F. Oesterle, University of Wisconsin, Madison, Wis. The paper was presented by Mr. Mueller, and described the investigation of various factors which might affect such welding. It was found that preheating at 300 degrees Fahr. is essential for welding of manganese-molybdenum steel castings containing 0.35 to 0.40 per cent carbon, 1.25 to 1.50 per cent manganese, and 0.20 per cent molybdenum, and that immediately after welding a stress relief should be applied to prevent cracking in the structure adjacent to the weld.

One speaker pointed out that in his foundry reduction of the carbon to 0.28 to 0.30 per cent and holding the manganese to 1.15 to 1.20 per cent aided in eliminating cracking. However, the castings must be cooled slowly after welding. While he admitted stress relieving was ideal, he was forced to use slow cooling by covering conveyors with insulating hoods, and that it worked out very well.

JOB EVALUATION SHOULD Be Co-operative Effort

UNDER the leadership of F. E. Wartgow, American Steel Foundries, East Chicago, Ind., and Jeff. Alan Westover, Dyer Engineers Inc., Buffalo, N. Y., chairman and co-chairman respectively, E. L. Berry presented a paper by himself and E. A. Berg on Wednesday evening, which ripped all the mystery away from the science generally called time study.

Mr. Berry and Mr. Berg are respectively vice president of, and head of wage incentive department, Link-Belt Co., Chicago, Ill. Their paper was entitled, "Use of Job Evaluation in Application of Time Study."

Fundamentally, there must be understanding by management of the people in the shops, involving friendly association with them in the realization that shop men have a lot to teach management. Management must realize that the workmen are interested primarily in three things, (1) Continuity of employment, (2) Good pay, and (3) Having a good boss. With that in mind, the first thing to do is to let the workmen in on the time study and job evaluation plan and by all means avoid "holding watches on people from behind posts."

Never allow persons who do not know the work themselves and who do not know how to work with their hands to evaluate the jobs of others or engage in any time study activities. Sensible, skilled men are the only ones fit to do this work and are the only ones who will not inspire workmen to try to put things over on the system. That is why at Link-Belt for years men have ben shifted back and forth between time study and supervision as a means of developing top flight managerial talent. As a result 60 per cent of all the firm's foremen have worked in the time study department and so have developed an unusual degree of "cost-consciousness" which lies right at the roots of profitable operation.

In getting at the elements of any job its fundamentals are considered in the following simple way, (1) Get ready, (2) Do, (3) Put away. In making for efficiency bear in mind that "there is no money in transporting empties," therefore tools and materials must be positioned so that every move counts. In line with this thought do not allow expensive labor to spend too much time handling and picking out gadgets. Let cheaper help do that.

According to the authors, wage incentive systems have merit only if based on complete honesty and understanding. They must be based on correctly measured production effort and rates must be guaranteed. Some managers do not realize that every workman has his "bible" in which he sets down the essential details of every job, so that when that job turns up again even after

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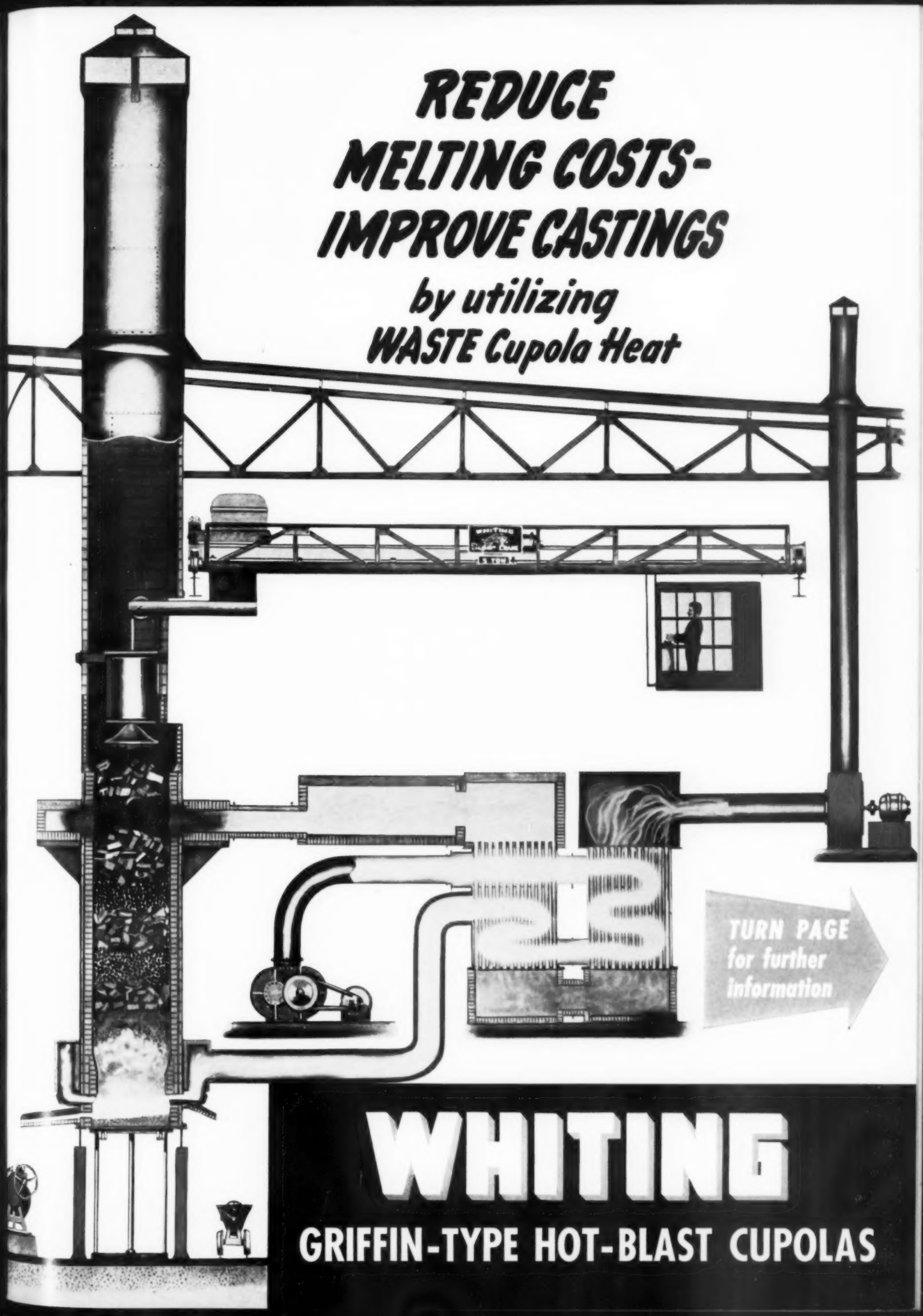

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WHITING

GRIFFIN-TYPE HOT-BLAST CUPOLAS

6 BENEFITS made possible by the recovery of waste cupola heat with the Griffin Hot-Blast Process

1 15% to 25% LESS COKE

The heat in the stack gases, ordinarily wasted, is utilized in this system. Hence, with equal temperatures of metal, coke consumption can be reduced from 15% to 25%.

2 HOTTER, MORE UNIFORM IRON

If desired, superheated iron can be produced. This means greater fluidity, freer pouring, better castings, and reduced rejection losses. Better structures can be produced because of the ease to superheat.

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A cupola capacity increase of over 10% is made possible through acceleration of the melting rate with high temperature blast.

4 LESS EXPENSIVE CHARGE

As there is less oxidation and sulphur pickup, a higher percentage of scrap and less pig can be used, and substantial savings can be made in silicon and manganese.

5 EASIER CUPOLA OPERATION

With hot blast, the slag is not chilled in front of the tuyeres. Bridging is greatly reduced, resulting in more uniform operation and better metal.

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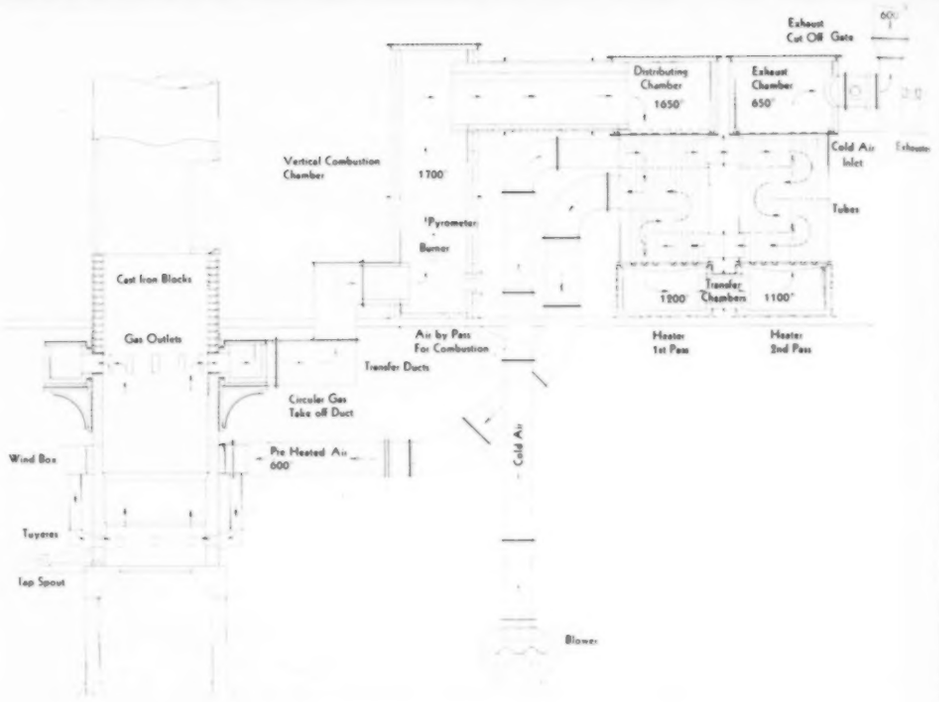
Loss of manganese and silicon by oxidation is reduced by approximately 50%. This means better control of composition.



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Gases are withdrawn from the cupola at a point below the charging door. From here they pass into a refractory furnace, where in the presence of sufficient air, the carbon monoxide in them is ignited and burned completely, increasing their temperature to approximately 1700°. The burned gases then pass into a preheater where most of their sensible heat is transferred to the blast. They are finally discharged through a small stack. *No additional fuel of any kind is used to preheat the blast.*

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(*Concluded from page* 96)

weeks or months, he looks in his "bible" and checks the rates. If a change has been made in the meantime, which has not been duly explained, it means a storm of protest even though it may involve only a few cents.

In setting rates, leeway of about 10 per cent above and 10 per cent below the normal is advocated to take care of the unavoidable differences in people—differences which always must be taken into account. As far as the bonus or incentive rate is concerned the authors believe that with today's high basic wage scales this cannot be much over 27 per cent above the normal rate and still be economically workable. One very important point is to make sure that automatic raises actually do go through on schedule. Foremen are too busy to take care of this unfailingly. Therefore, the personnel department should check up on every man once a month to make sure that no one's deserved increase has been overlooked.

The merit rating of each man is highly important and at the same time highly confidential. Never show this to another workman. When a man's work falls below his own top merit rating, that is a sure sign that something is wrong. It may be health, it may be domestic troubles, but it should be promptly and tactfully investigated—avoiding any sign of paternalism, however. In setting up merit ratings the desire of the individual to progress is the most important factor to be considered.

In closing, Mr. Berry pointed out that in building its organization, his firm has had the best results in hiring likely appearing "green help" and training to suit. As a result very few skilled people are hired. Among other things, this avoids the possibility of hiring people away from industrial neighbors and thus creating friction.

SAND RESEARCH INDICATES

Progress Being Made

SYNTHETIC sand loses its moisture content more rapidly than natural sand so that it becomes advisable to examine additions which will have the effect of slowing down the drying action, said N. J. Dunbeck, Eastern Clay Products Co., Eifort, O., at the Wednesday evening session on sand research. Glycerine has been tried, with good results, but this proved expensive. Good results were obtained by adding fuel oil but this practice encounters a definite objection as it results in a smokey atmosphere. Good results were obtained by adding lithium chloride, calcium chloride, ethylene glycol, Southern bentonite, Western bentonite, fireclay, cereal and glucose.

While Mr. Dunbeck stated that he did not consider the chlorides to be entirely desirable, he found that they delayed the drying action more than any other additions. In cases where synthetic sand lost 32 per cent of its moisture in 6 hours a small addition of lithium chloride reduced the drying loss to 22 per cent. Furthermore, lithium chloride addition had little effect on both dry and wet strength, and it did not affect durability of the clay in the sand mixture.

While his experiments did not go that far, he was of the opinion that chloride additions do not lower the sintering point. The important point, he said, is that whereas the surface of a synthetic sand mold, without additions, will dry in one hour, a small addition of lithium chloride keeps it moist for at least 22 hours, thus permitting the molder to do any patching and repairing that is desired. Experiments indicated that a reduction of only 5 per cent in the drying rate proves highly beneficial.

Mr. Dunbeck reported that results already disclosed reveal that a continuance of this study is highly desirable, to the end that foundrymen may know just how to use synthetic sand to best advantage. Evaporation of moisture from synthetic sand, incidentally, is a far different problem than the drying of natural sand in view of the larger amount of water that is used with natural sand.

Synthetic sand has greater durability than natural sand. That was the main conclusion from an investigation on which a report was submitted by J. CoVan, University of Illinois, Urbana, Ill. The work covered sands containing bonds of different types, but in general the life of synthetic sand mixtures was longer.

An unusual investigation was the subject of a paper by A. S. Nichols, F. W. Hintze and F. L. Overstreet, Illinois Clay Products Co., Chicago. A casting was designed deliberately to bring out all classes of defects that occur in customary practice and several hundred of them were cast. The object was to determine the overall merit of various bond clays.

These authors defined the requirements of a satisfactory clay bond as follows:

1—It must not introduce sand properties which will hinder reproduction of good sound castings which can be economically cleaned.

2—It must bond the new and reclaimed sand grains to a green strength capable of making a mold at a cost per ton of castings that is less than that obtained with other bonds.

3—It must not introduce sand properties which make for excessive cost in mold-making and sand-handling.

Amounts of bonds used to obtain the original 10-pound green compression strength were: Illite 20 pounds, Western montmorillonite 10.5 pounds, Southern montmorillonite 9 pounds, kaolinite 30 pounds. Additions to maintain this strength throughout twenty casts were, respectively, 8.75, 6, 16.25 and 7.5 pounds, thus showing that it is misleading to evaluate a clay on the initial bonding power alone.

Cost of maintaining reserve strength with the different bonds was found to be highest for Southern montmorillonite, with Western montmorillonite, illite and kaolinite next in order. Illite and kaolinite were found to have the highest degree of durability.

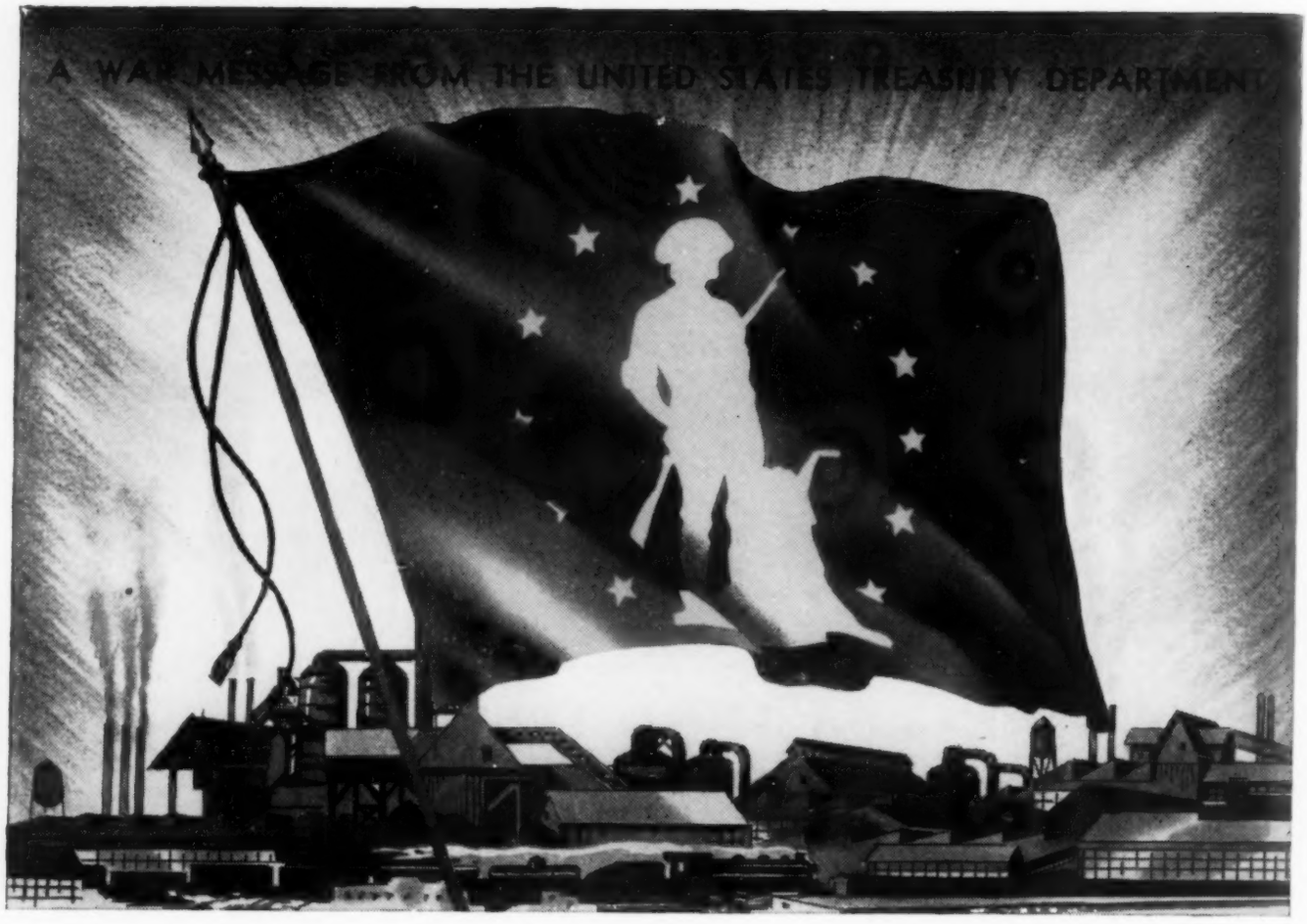
Effect of High Temperature

In a sand research session held Friday morning under the direction of Chairman N. J. Dunbeck, Eastern Clay Products Co., Eifort, O., and Vice Chairman C. M. Saeger Jr., Bureau of Standards, Washington, J. R. Young, Cornell University, Ithaca, N. Y., presented a report of further investigations of sand properties at high temperatures. He described the work that committee 6B7 has performed since last year when a report was made, and stated that further investigation will get underway shortly. Information obtained from tests conducted indicate that as ramming intensity is increased, green and dry strength of the sand increase, but hot strength decreases under high temperature conditions.

E. O. Lissell, University of Michigan, Ann Arbor, Mich., presented a paper prepared in collaboration with E. J. Ash, also of the university, on flowability of foundry sands. The paper pointed out that flowability of sand involves compression flow caused by flow of binder between sand grains, and movement of the grains in the direction of the applied force, and true flowability which is the flow of sand in directions other than that of the applied force. An extrusion test was described as an approach to determining true flowability.

Emil Pragoff Jr., Hercules Powder Co., Wilmington, Del., presented a paper prepared in collaboration with

(*Concluded on page* 101)



Next to the Stars and Stripes . . .

AS PROUD A FLAG AS INDUSTRY CAN FLY

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IT doesn't go into the smoke of battle, but wherever you see this flag you know that it spells Victory for our boys on the fighting fronts. To everyone, it means that the firm which flies it has attained 90 percent or more employee participation in the Pay-Roll Savings Plan . . . that their employees are turning a part of their earnings into tanks and planes and guns *regularly,* every pay day, through the systematic purchase of U. S. War Bonds.

You don't need to be engaged in war production activity to fly this flag. Any patriotic firm can qualify and make a vital contribution to Victory by making the Pay-Roll Savings Plan available to its employees, and by securing 90 percent or more employee participation. Then notify your State Defense Savings Staff Administrator that you have reached the goal. He will tell you how you may obtain your flag.

If your firm has already installed the Pay-Roll Savings Plan, now is the time to increase your efforts: (1) To secure wider participation and reach the 90-percent goal; (2) to encourage employees to increase their allotments until 10 percent or more of your gross pay roll is subscribed for Bonds. "Token" allotments will not win this war any more than "token" resistance will keep our enemies from our shores, our homes. If your firm has yet to install the Plan, remember, TIME IS SHORT.

Write or wire for full facts and literature on installing your Pay-Roll Savings Plan now. Address Treasury Department, Section D, 709 12th St., NW., Washington, D. C.

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This Space is a Contribution to Victory by THE FOUNDRY

U. S. GOVERNMENT PRINTING OFFICE 16—27879-1 Form No. DSS-BP-1

(*Concluded from page* 99)

C. P. Albus of the same firm, on the effect of resin binders on the properties of molding sands. Investigation showed that resins increase green strength, decrease permeability slightly, have little effect on deformation, greatly increase dry strength, increase mold hardness, have little effect on expansion, reduce contraction, etc.

The authors point out that it is necessary for the foundryman to determine for himself whether addition of resin to molding sand will improve the quality of his castings. Excessive additions of resin, like many other materials, will cause trouble, and tend to waterproof the sand so that it is not wet readily with water.

In discussing "Sea Coal and Fuel Oil in Foundry Sands", at the Sand Research Session, Thursday morning, E. C. Zirzow, National Malleable & Steel Castings Co., Cleveland, pointed out that the main function of seacoal is to prevent the sand grains from burning on the metal and to improve the finish of the castings. He explained that seacoal must be used to improve the finish of castings inasmuch as it is impossible to ram molds to such a degree of hardness that the openings between the sand grains would be microscopic in size. A cushion is formed at the surface of the casting and this with the coke fills all the voids between the sand grains thus giving the desired smooth surface.

Selection of the proper seacoal involves the weight, the surface area, and cross-sectional area of the casting as well as the grain fineness of the sand. Such casting defects as rat-tails, cold shuts, misruns, dirt, drops and surface checks are caused by the addition of too much seacoal.

While fuel oil can be used in conjunction with seacoal, the author explained, the greatest objection to its use is the amount of smoke or fumes produced. He asserted that fuel oil may be added to the molding sand in the same manner as seacoal, namely, with facing, at tempering belt, and with rebonding mixture. The quantity of oil added per batch of facing sand depends upon the requirements of the facing in the foundry. Addition of oil will vary from one quart to three gallons for 800 pounds of sand. Addition of fuel oil to the system sand has made it possible to reduce the moisture content about 0.5 per cent, Mr. Zirzow stated. He found this not only effected a saving in the amount of clay bond used, but also helped to increase the permeability of the foundry sand.

W. A. Hambley, co-author with K. Geist and A. Lebesh, Allis-Chalmers Mfg. Co., Milwaukee, of a paper "Dry Sand Molding Procedure for Heavy Castings" pointed out that as soon as blueprints of the casting are ready a meeting of the foundry department is held in order to check the various steps carefully. Such phases as sharp corners, obtuse angles, type of metal to use, position of gaggers, etc., are studied. Difficult problems involved in tying in cores are solved easily by taking a model and studying it.

Mr. Hambley described concrete pits used by his company in making large castings. The pits are 10 x 14 feet and 24 x 40 feet and 14 feet deep, having a wall thickness of 18 inches.

Sand is rammed in the bottom of the pits followed by coke of chestnut size and the vent pipes placed in position. This is covered with straw, burlap or heavy paper and on top of this a 6-inch layer of sand is rammed. The bottom section of the pattern is placed in the pit and securely braced. A 6-inch facing is rammed hard around the bottom of the pattern. Rods then are laid in place followed by ramming a 6-inch layer of sand; this procedure being continued until the entire pattern is covered. Heater pipes are placed in the cope. Gaggers are placed carefully in the cope and rammed. The mold is heavy washed with plumbago and then is dried for a period of 90 hours.

The committee report on sintering sands recommended that this report be used and pointed out that 8 variables should be checked beforehand.

CUPOLA REFRACTORIES

Are Important Materials

MONOLITHIC cupola lining and patching, natural stone as a cupola refractory and general cupola patching were the subjects discussed in papers presented at the refractories session Tuesday evening. J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala., chairman of the meeting, pointed out the many uses for natural refractory stone and its economies in some foundries; the economies obtained being dependent upon size of cupola, knowledge and skill of the workmen placing the lining, and other factors. He recommended that accurate cost figures be kept to use as a guide to determine which type of refractory lining is most economical for each cupola operation in the foundry.

Charles S. Reed Jr., Chicago Retort & Firebrick Co., Chicago, co-chairman of the session, described in his paper an unusual instance where an investigation of patching clay revealed it had a fusion point 200 degrees below the probable melting zone temperature. In an effort to cut costs, a clay with a known fusion point of 3050 degrees Fahr.

(*Concluded on page* 104)

Pattern apprentices throughout the country have competed in local contests and the local winners were judged at the annual convention of the American Foundrymen's Association in Cleveland. This illustration shows Robert Rankin at the right, an apprentice at the Bucyrus Erie Co., South Milwaukee, Wis., as he completed his pattern in the contest sponsored by the Wisconsin Chapter of the American Foundrymen's Association. The work is being inspected by J. R. VanKooy (center), a Milwaukee Vocational School instructor and Richard S. Falk (left), Falk Corp., Milwaukee, and chairman of the chapter's Committee on Apprentice Training

W. F. Gollmar, V. P. and G. M. of Elyria Foundry says: "Our Motive Type *Speedslinger* is ramming 75 percent more work than we could previously handle. It gives us a greatly improved ramming job, and provides far more accurate sand control."

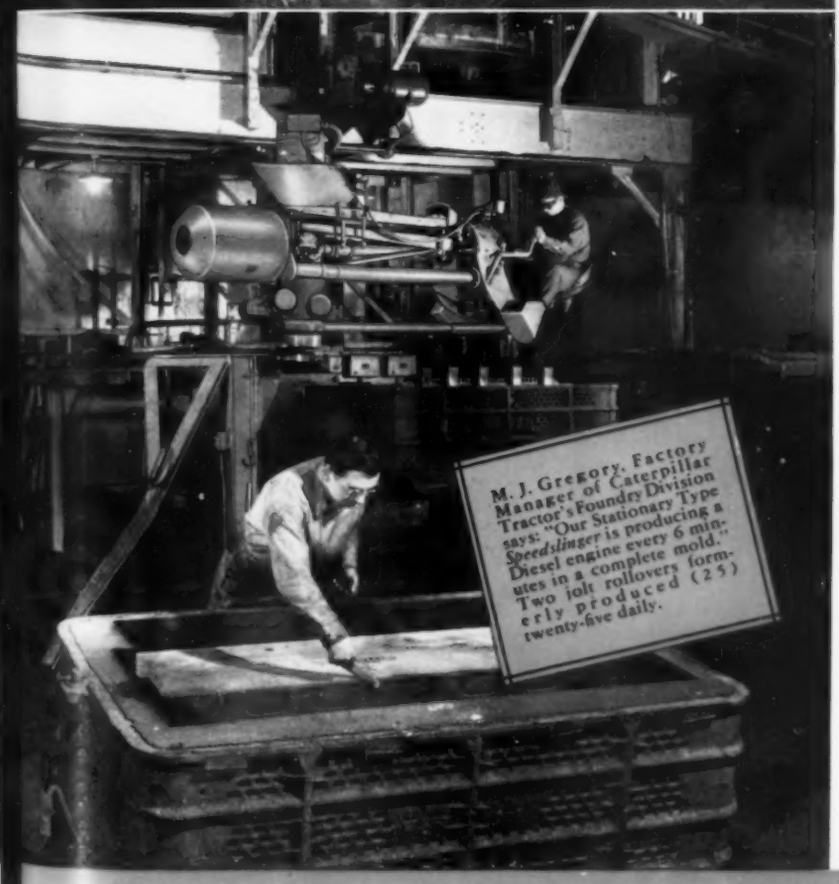
71 Speedslingers

in the field and on order are capable of ramming 213,000,000 pounds of sand every 24 hours at a saving of $95,850.00 per day.

The tremendous ramming capacity of a *Speedslinger* would seem utterly impossible were it not being proved daily on the toughest kind of armament work.

This most modern and most flexible method of ramming is trebling production within existing floor space—ramming molds of all sizes from snaps to the largest pit jobs.

Motive Type *Speedslinger* at Elmira Foundry, Elmira, N. Y. A standard type *Speedslinger* with no special equipment will ram 1,000,000 pounds of sand every eight hours without overloading. Will save at least $450 every eight hours of ramming time.


M. J. Gregory, Factory Manager of Caterpillar Tractor's Foundry Division says: "Our Stationary Type *Speedslinger* is producing a Diesel engine every 6 minutes in a complete mold." Two jolt rollovers formerly produced (25) twenty-five daily.

The *Speedslinger* is the most productive unit ever devised for ramming molds of all shapes and sizes.

A standard *Speedslinger*, without special equipment or accessories, will ram 1,000,000 pounds of sand every eight hours without overloading—will ram more secure molds than have ever been rammed before, and with less gaggers and bars. On one of the first installations, the number of gaggers used on a single mold was reduced from 118 to 15, demonstrating the accuracy and uniformity of *Speedslinger* ramming. The time formerly required to set the 118 gaggers was greater than the present ramming time.

Such every day performance represents the lowest ramming costs ever known as evidenced by savings of $450 during every eight hours of operation. If you want castings that are smooth, true-to-weight and pattern, ram them with a *Speedslinger*.

The Beardsley & Piper Co.

2541 North Keeler Avenue • Chicago

(*Concluded from page* 101)
was tried, and not only did the whole patch disappear but the attack on the lining behind the patch was twice as severe as when the low fusing clay was used.

This apparent anomaly was explained by supposing that the first clay formed a dense and resistant glass, by the time the charge melting temperature had been reached, whereas the second clay merely turned to brick and as such was open to the attack of the charge which is very severe. There the absence of the dense glass-like protection not only reduced the patch itself to slag but the brick work behind it. This reveals the value of determining the actual fusion point of the patching material and of comparing it with known spout temperature.

Commenting from the floor, C. E. Bales, Ironton Fire Brick Co., Ironton, O., emphasized the lowering of fusion temperatures when clays are mixed. He told how pure kaolin (fusion point, 3200 degrees Fahr.) when mixed with a red molding sand (fusion point, 2750) formed a eutectic that melted at 2600 degrees, a lower temperature than either of the ingredients. Such action has frequently caused the failure of melting-zone linings, he stated. It was brought out that it was much better to use spent sand from sand blast machines than to use burnt molding sand as an addition in patching linings.

In his paper on monolithic cupola linings, R. A. Clark, Lakey Foundry & Machine Co., Muskegon, Mich., pointed out that certain foundries in this country are running heats of 16 to 20 hours with monolithic patches, while other plants working under apparently similar conditions have had very poor results. Variation in materials and method of use were deemed responsible, rather than any inherent fault in this method of patching.

SCRAP AND COMBUSTION

In Cupolas Are Reviewed

THE cupola research session held on Thursday morning was opened by Chairman Don J. Reese, International Nickel Co., New York. He presented a brief outline of the activities of the cupola research project of the A. F. A. stating that it took on some of the aspects of a three-ring circus. The first ring was devoted to a review of literature over a number of years relating to cupolas, and publishing abstracts of pertinent information. At present some 614 articles have been abstracted, and those abstracts sent to interested committeemen.

The second ring constituted the numerous committees and their subcommittees covering various phases of cupola operation. Those committees are preparing reports which will be correlated and published in the form of a book perhaps at the end of this year. The third ring relates to research or its need as indicated by the lack of definite or accurate information in the literature.

Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va., and chairman of the subcommittee on scrap in cupola melting presented a report on classification of scrap. He pointed out that the report was to be considered from the long range viewpoint rather than that of the present emergency since the classes of scrap enumerated in the report were those available in normal times.

The report lists 14 types of gray iron scrap, 4 types of malleable scrap and 4 types of steel scrap, and the characteristics of each. In addition information is given on the method of using the scrap; use of iron and steel briquets, and a brief discussion of the metallurgy involved when large quantities of scrap are used.

S. C. Massari, Association of Manufacturers of Chilled Car Wheels, Chicago, and chairman of the subcommittee on fuels and combustion, gave a review of his subcommittee's report on chemical reactions and thermal balance in a cupola.

Following the presentation of the reports a question was asked on the drawbacks of using steel punchings in cupola mixtures, and why steel bundles should have a minimum density of 40 per cent that of iron. The replies were that both had large surface areas compared to volume which increased oxidation losses, and offered possibilities of causing other troubles if used in any quantity.

In reply to a question on how to determine when efficient combustion was being obtained without the use of instruments, it was stated that observance of manganese and silicon contents of charged material and resulting iron gave a good indication. In other words, if the losses of those elements was low and uniform throughout the heat, the assumption could be made that efficient combustion was being secured under the particular conditions.

CASTINGS CLEANING

IN A session on plant and plant equipment held Thursday afternoon under Chairman James Thomson, Continental Roll & Steel Foundry Co., East Chicago, Ind., and Vice Chairman W. R. Jennings, John Deere Tractor Co., Waterloo, Iowa, casting cleaning in a gray iron foundry was discussed by Howard B. Nye, New York Air Brake Co., Watertown, N. Y. The first part of the discussion was devoted to the advantages and disadvantages of various types of cleaning equipment while the second part gave comparisons on operational costs. He said that in his plant for a number of years medium size castings weighing from 10 to 70 pounds were cleaned in air barrels. Close investigation led to a change to airless barrels with a considerable reduction in cost.

Similarly another type casting was changed from cleaning by tumbling to that using an airless blast cabinet. In the discussion which followed Mr. Nye's remarks a question was asked on the size of metallic abrasive used. He said that trials using shot from No. 14 to No. 22 led to standardization on No. 17. He mentioned that while there was less shot used when the smaller size was employed, he had found that it left the casting rougher than desired. One important item in reducing maintenance of airless blasting wheels or blades was to see that all sand was removed from the shot before recirculating since it caused rapid wear.

One speaker pointed out that he had found it advisable to place a piece of plywood under the blast in approximately the same position as the casting would occupy for determining the pattern of the abrasive. Mr. Nye said that he used a piece of steel plate for the same purpose. Asked about blade life, he stated that it was about 100 hours.

In the absence of W. R. Bean, chief, Foundry Equipment and Supplies Unit, Tools Section, War Production Board, Washington, Frank G. Steinebach, THE FOUNDRY, spoke on priorities and foundry equipment. He pointed out that today foundrymen were in a tough spot—large firms being swamped with orders and plagued with shortages of raw materials while the small firms were faced with extinction unless they produced castings for the war. It is a situation that must be faced, and the sooner that is done, the better for all concerned. Mr. Steinebach discussed the necessity of priorities and the procedure to be followed, and answered numerous questions relating to the subject.

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CORRECT grain, correct bond, correct porosity . . . careful attention to these features determines the extent to which a grinding wheel becomes your wheel . . actually fitted to your job! If the proper proportions exist between grain, bond and porosity - if they have been determined according to the demands of your snagging operation - you will have an efficient, fast-cutting, cool wheel . . a Sterling Wheel!

Building wheels to solve particular problems has been our job for many years. Today, it is more important than ever that you use wheels whose formulas have been pre-determined according to what you expect them to do. There is no place in today's victory program for "just any old wheel". Wheels must be engineered to the job.

Busy foundrymen appreciate the information contained in the new Sterling Catalog No. 42. We will gladly send your copy upon request.

Busy in every section of the country are Sterling engineers, skilled in all types of foundry grinding. Their years of experience can be yours at no cost or obligation. Talking with a Sterling engineer may result in an immediate pick-up in your production, plus a saving in time and money! Write today, and we will put you on our schedule for immediate attention.

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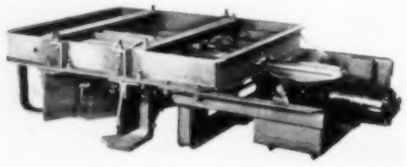
THE WHEELS OF INDUSTRY

new equipment and supplies

Track Switch

Cleveland Tramrail division, Cleveland Crane & Engineering Co., Wickliffe, O., has designed a new electrically operated track switch for use on cab operated, gravity or automatic dispatch overhead materials handling systems. This development enables the operator to preset the switch at some distance ahead while traveling and thus save time lost when switching by hand. Indexes on gravity or automatic



dispatch carriers may be set to actuate trippers which will cause one or several switches to take desired positions. The switch consists of two main assemblies, an outer supporting frame and an inner sliding frame. The outer frame is bolted rigidly to the super structure. The inner assembly carrying a straight and a curved rail, rides on multiple easy operating rollers and is set in position by a motor driven cam.

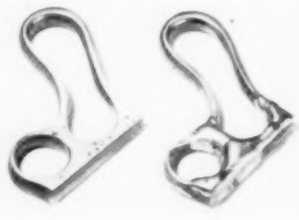
Belt Sander

Jefferson Machine Tool Co., Cincinnati, has developed endless belt sanders on which large, flat, concave or concave surfaces on wood or metal can be finished rapidly and economically. The substantial table travels on ball bearing rollers and is moved easily in either direction. The sanding belt responds quickly

to the touch of the operator and the belt travels at the right level for the operator to work in a natural position. There is no cross rail between the standards to obstruct vision. Overhead idlers keep the upper part of the belt out of the way. Belts may be changed easily and quickly. Vertical table adjustment of 10 inches provides room for large pieces. Belt standards may be set at any desired distance apart to accommodate long surfaces. An auxiliary table can be placed on the regular table for handling exceptionally long pieces. The table stand readily may be moved to one side for special work. The machine is driven by a 2 horsepower motor, fully enclosed.

Welding Alloys

Eutectic Welding Alloys, Inc., New York, has developed a new process and materials for reclaiming certain classes of defective castings. The damaged or defective surface of the casting is preheated to a temperature considerably below the melting point of the metal and then repaired with specially alloyed welding rods which melt and bind below the melting point of the base metal. Appearance and color of the welds is said to be similar to the parent metal. It is claimed tensile strength, physical properties, and chemical corrosion resistance are not changed. Welding rods are



available for cast iron, malleable iron, cast steel, steel forgings, brass, bronze, copper alloys, nickel alloys, aluminum alloys, magnesium in sand and die castings.

Jib Crane

Chicago Tramrail Co., Chicago, has designed and added to its line of jib cranes a new pillar type, self supporting unit, as shown in the

accompanying illustration. The new unit swings through an arc of 220 degrees and is available in lifting capacities up to 1 ton and in radius of 12 feet.

Intercommunication

Allied Radio Corp., Chicago, has designed an intercommunication system to meet the demands of diversified production methods in industrial plants. It is claimed the system speeds production, eliminates time waste, cuts cost, overrides plant noise, reduces rejects and material waste. The system offers complete privacy of conversation, silences sub stations when not in use. The system has 2½ watts power output, enabling 10 substations to carry five simultaneous 2-way conversations. Up to 2000 feet of cable may be used between each station. The device is housed in walnut finished cabinet, 5¾ x 6 x 12 inches for 110-115 volt alternating or direct current operation.

CLEAN CASTINGS
INCREASE PRODUCTION

TAM FOUNDRY ZIRCONITE SAND YIELDS SMOOTH CASTINGS AND REDUCES CLEANING TIME

TAM Foundry Zirconite Sand used for the entire mold or as a facing sand resists the burning in of the metal and makes possible the production of clean castings and the expansion of output by reducing time in the cleaning department.

TAM Foundry Zirconite Sand does not warp, requires minimum venting and the faster chilling permits better metal distribution into heavy sections and reduces "hot tears"! Four important factors.

TAM Foundry Zirconite Sand is available in three grades, Zirconite Sand A has an approximate melting point of 3812° F. Zirconite Sands B and C 3650° F.

Full particulars on the proper applications of Foundry Zirconite Sands will be sent immediately upon request. Write:

TITANIUM
ALLOY MANUFACTURING COMPANY

TAM Foundry Zirconite Sand "A" was used in the core for the chrome steel impeller wheel illustrated. Note the clean, smooth surfaces.

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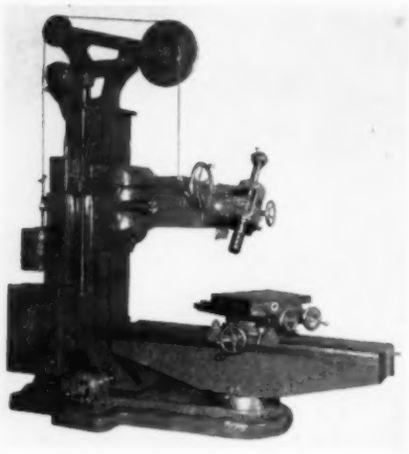
Pattern Milling

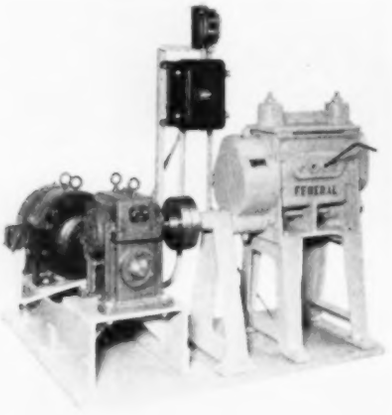
Oliver Machinery Co., Grand Rapids, Mich., has made design changes in its universal pattern milling machine, as shown in the accompanying illustration. Pulleys inside the



column are protected from dust and chips. Instead of the former three step cone pulley the main spindle is driven from a variable speed motor. Electrical equipment is entirely modernized. Three motors instead of one are used for driving the machine. One drives the cutter head. A second drives the feed mechanism. The third motor raises and lowers the main arm. For convenience to the operator, a single control panel is mounted on a swinging arm supported on the main column. Push buttons control all motors at proper speeds forward and reverse, up or down, right or left rotation. A direct push on a safety type button is necessary to start any motor. All wiring is in conduit.

Wire Straightener

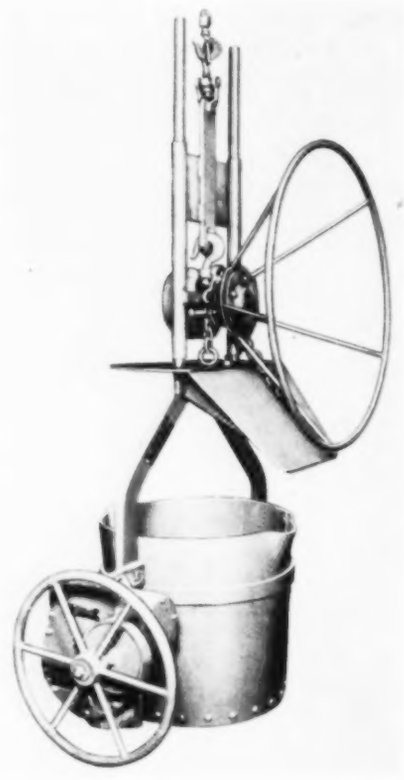
Federal Foundry Supply Co., 4600 East 71st street, Cleveland, has designed a wire straightening machine directly connected through a flexible coupling to a gear reducer which in



turn is connected to an electric motor. The 90 degree angle reducer permits mounting the motor close to the machine. The unit will handle wire from $\frac{3}{16}$ to $\frac{1}{2}$-inch inclusive. The motor may be 4 or 5 horsepower running at 900 revolutions per minute. The machine is controlled from the front through a remote control push button station. The entire unit is mounted on a steel plate resting on the floor and can be set up at any convenient point. A magnetic switch with overload protection combined with flexible couplings incorporated in the drive eliminate any danger of burning out the motor.

Ladle Hoist

Whiting Corp., Harvey, Ill., has developed a new ladle hoist in which a telescoping frame can be clamped to various types of ladle bails. An efficient hoist mechanism operated by a large hand wheel lifts the ladle quickly with minimum effort. A



swivel ladle clamp permits setting the hand wheel in convenient position. All running parts are totally enclosed in a dirt proof housing and operate in an oil bath requiring only periodic attention. The hoist mechanism, self locking in any position, is suspended from the trolley independently of the frame. A high strength alloy steel chain and hook take the place of the usual exposed gear tooth device. Height of the hand wheel does not vary with the elevation of the ladle and the wheel always remains cold. The device can be fastened to any standard monorail trolley generally used in the foundry. The ladle lift is 2 feet under minimum monorail head room of 9 feet. It is claimed a 35 pound pull is sufficient for a 1000 pound ladle and proportionally less of smaller ladles. The new ladle handler can be furnished in capacities ranging from 300 pounds up to the maximum carrying capacity of the monorail track.

Hydraulic Valve

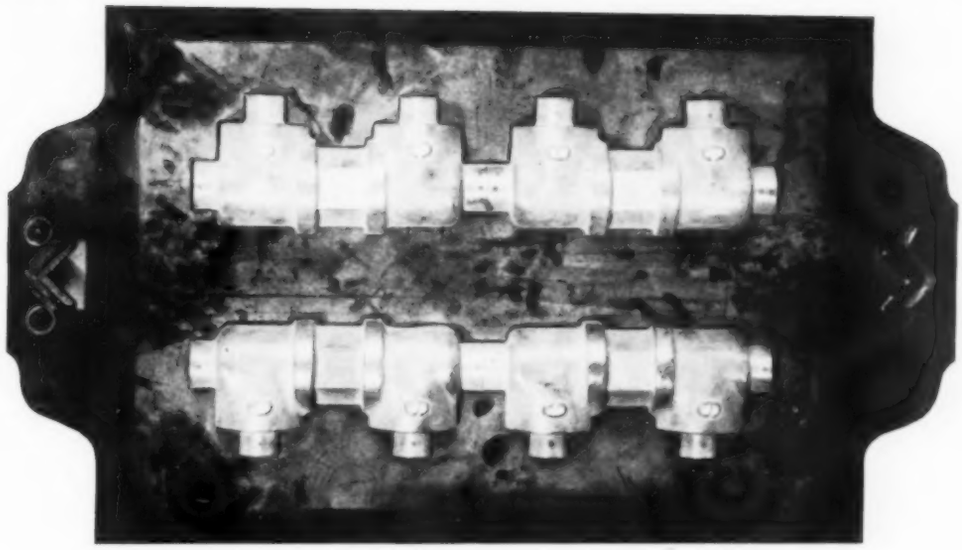
The Galland-Henning Mfg. Co., Milwaukee, has developed a new type hydraulic valve claimed to obviate pressure locking and other troubles in installations where the pressure is 1000 pounds or more. Because the hydraulic pressure inside the valve is always balanced it never can become pressure locked. The lever is operated just as easily from either the *on* as from the neutral position. As a result it is claimed the new valve steps up the productivity of high pressure hydraulic machinery and eliminates

undue fatigue on the part of the operator. The valve has only one moving part and with simplified design makes it practically wear proof which eliminates nearly all maintenance expense. The new valve is available in four sizes $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1-inch.

Blackout Paint

Reilly Tar & Chemical Corp., Indianapolis, Ind., has developed a blackout paint. It is claimed a single coat applied by brush to the outside surface of windows gives a heavy, opaque, water proof surface that effectively blacks out inside light and prevents reflection of outside light. The paint adheres to the glass, and easily may be removed when desired. It is extremely resistant to moisture and corrosive vapors and withstands wide temperature ranges. The paint is available in 1 and 5 gallon cans and in 50 gallon drums.

LIGNOLITE



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AN EXTREMELY TOUGH LIGNIN PLASTIC

- Half the weight of aluminum.
- Easily machined, sawed, drilled, tapped, etc.
- Impervious to moisture, oil, grease, dilute acids.
- Uniform caliper and non-warping.
- Abrasion proof and non-slip surface.

Unlimited Supply . . . Low Cost

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Available in all flask sizes 7/16" to 1-1/8" thick or in 46" x 46" size for own cutting—Plates are octagonal shape with 1" allowance for flask and 2-1/2" allowance for ears. Order by flask size and specify thickness.

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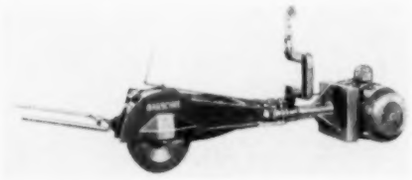
ROTHSCHILD **WISCONSIN**

Swing Grinder

Vonnegut Moulder Corp., 1839 Madison Ave., Indianapolis, Ind., in offering a newly designed swing frame grinder claims an exceptionally high grinding efficiency through



smooth spindle rotation, three spindle speeds, simplicity of speed changes, balance and special protection of spindle bearings, motor pulley and all adjustments from action of sparks or abrasive grit. Wide variations in operating conditions are met by provision for easy angling of the wheel head up to 90 degrees from vertical, right or left and for adjusting the handle to most convenient high and low grinding positions. Standard equipment includes a totally enclosed fan cooled motor with push button control station on the wheel guard, also 20 feet insulated cable. Control box is provided with thermal overload relay and low voltage release. The new grinder takes wheels 16, 18, 20 and 24 inches diameter powered with motors ranging from 7½ to 25 horsepower.

Cuts Large Risers

Demonstrated need for a machine with greater flexibility on work too large or too heavy to be handled effectively with existing machines prompted the Tabor Mfg. Co., Philadelphia, to develop an entirely new machine. In the new machine, shown in the accompanying illustrations, the cutting wheel can be operated in any position within an oval floor area 14 x 18 feet to cut gates, risers, fins, etc., at practically any angle from almost any shape casting that can be brought within the 220 square feet working area. The machine consists essentially of a movable column, carrying a swinging arm with a universally mounted spindle frame and motor driven abrasive wheel on the outer end.

To obtain the desired flexibility of operation, the main column can be moved back and forth 4 feet. The arm can be swung completely around the column. The spindle frame and wheel can be swung 270 degrees around the end of the arm and can be rotated a full 90 degrees either way from the normal vertical cutting position. The cutting or chopping movement of the wheel is through an arc which varies from 32 inches in the vertical to 16 inches in the horizontal position.

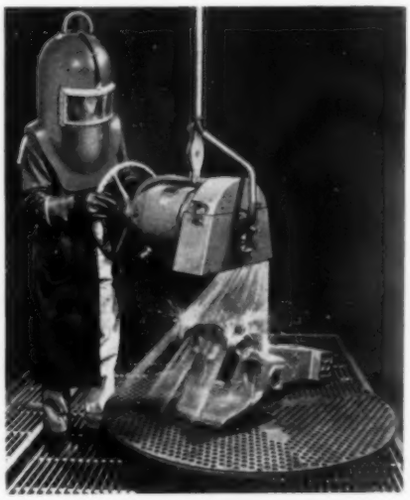
Castings to be cut are clamped to a universal T-slotted table 30 inches diameter which can be rotated and also tilted 90 degrees from the horizontal to a vertical position. Table units, raised or lowered 20 inches by air-hydraulic control, also may be rotated 360 degrees about the vertical axis, making it possible to swing a casting to any position even though the top of the table is tilted. The tables are designed to handle castings up to 500 pounds in weight and with the center of gravity 9 inches above the table top. The table may be locked in any position. Castings too large for table mounting can be positioned on the floor. With two or more tables, castings can be mounted while the operator is working on one table. Extra tables also allow time for chipping and grinding while the castings are still clamped in position.

All movements for bringing the wheel into cutting position, with the single exception of the hand chopping action, are spring locked and electrically operated and controlled from the 10-button station on the spindle frame within easy reach of the operator. The abrasive cutting wheel is 3/16-inch thick and 20 inches in diameter.

A motion controlled, vari-pitch v-belt drive from the cutting motor to the spindle provides for the correct peripheral speed as the wheel wears down to 16 inches diameter. Advantages claimed for the new machine include reduced cutting time, cost and effort; reduction of snagging operations, and saving in metal.

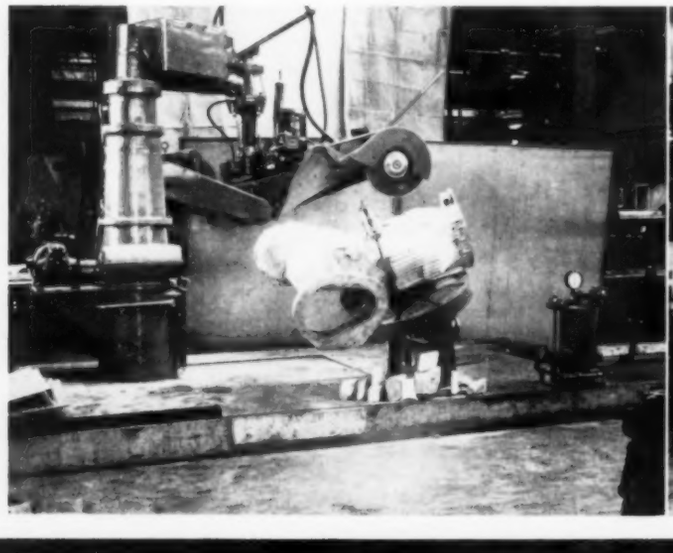
Portable Cleaning

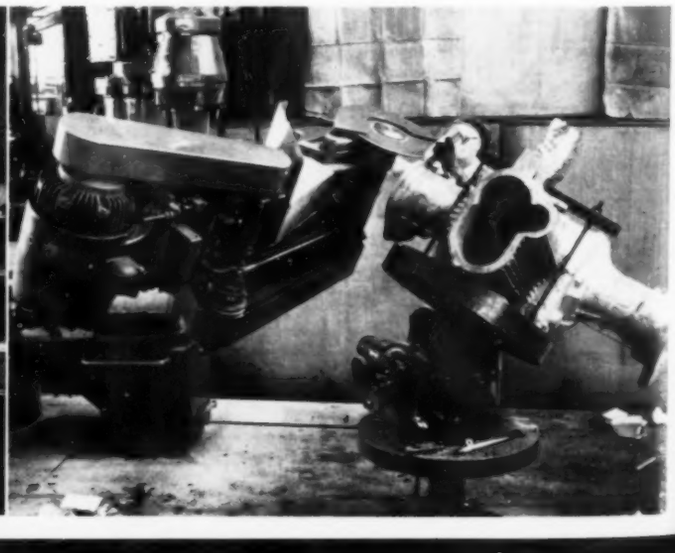
American Foundry Equipment Co., Mishawaka, Ind., has developed a new portable type cleaning unit, shown in the accompanying illustration. As with other designs of the wheelabrator operation of the new

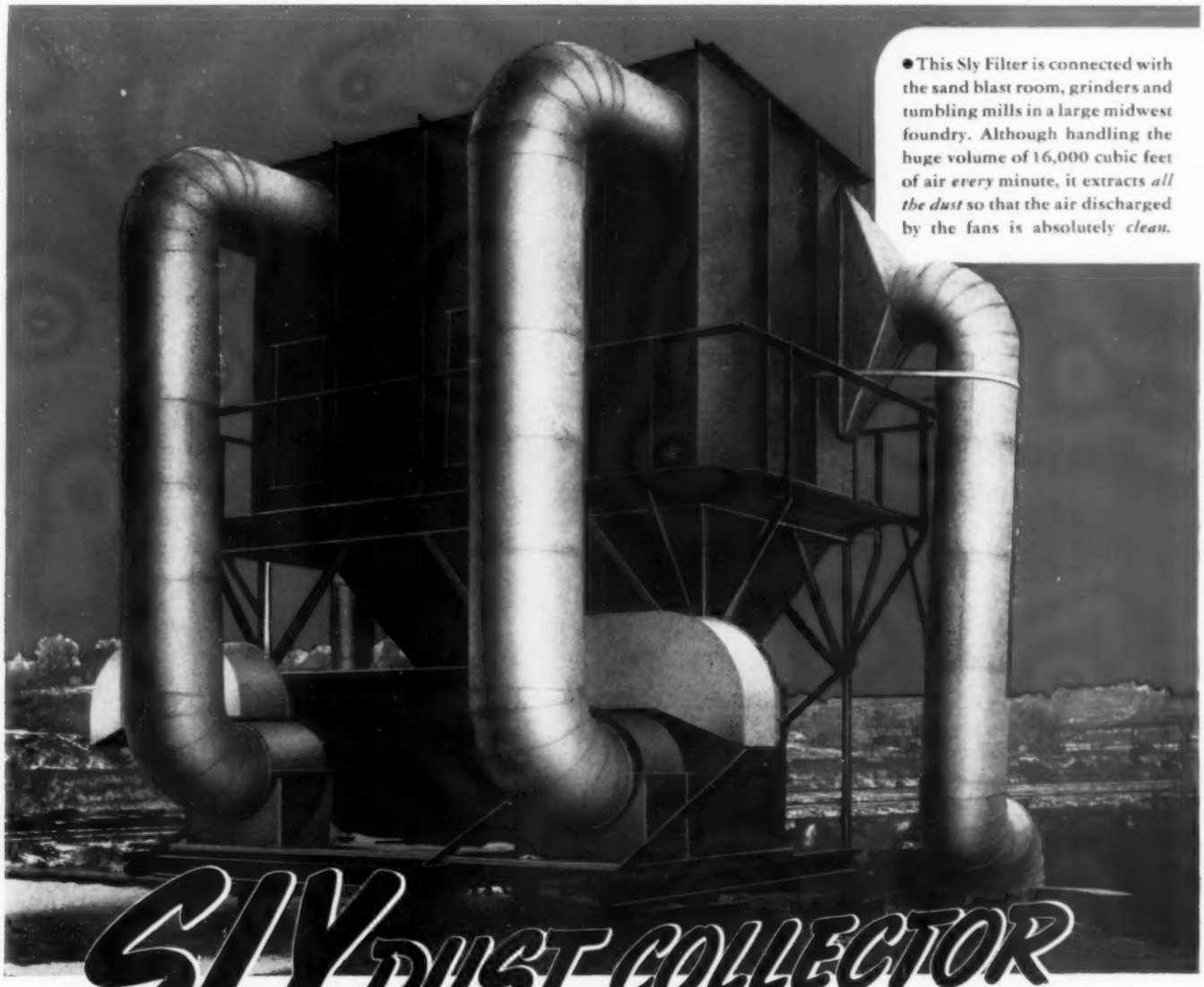


unit is entirely mechanical. The portable unit is suspended by cable connected to a spring balance so that it may be lowered or raised easily. The balance is mounted on a carriage free to move on a radial track. By turning a hand wheel on the integral unit the operator can direct the stream of abrasive in any direction. Abrasive material is fed to the wheel through a pipe from an overhead hopper. Universal couplings permit complete flexibility. Operation of the wheel and the flow of abrasive are regulated by convenient controls. Direct con-

(*Concluded on page* 113)







● This Sly Filter is connected with the sand blast room, grinders and tumbling mills in a large midwest foundry. Although handling the huge volume of 16,000 cubic feet of air *every* minute, it extracts *all the dust* so that the air discharged by the fans is absolutely *clean.*

SLY DUST COLLECTOR

FILTERS ALL DUST

OUT OF 16,000 CU. FT. OF AIR PER MINUTE

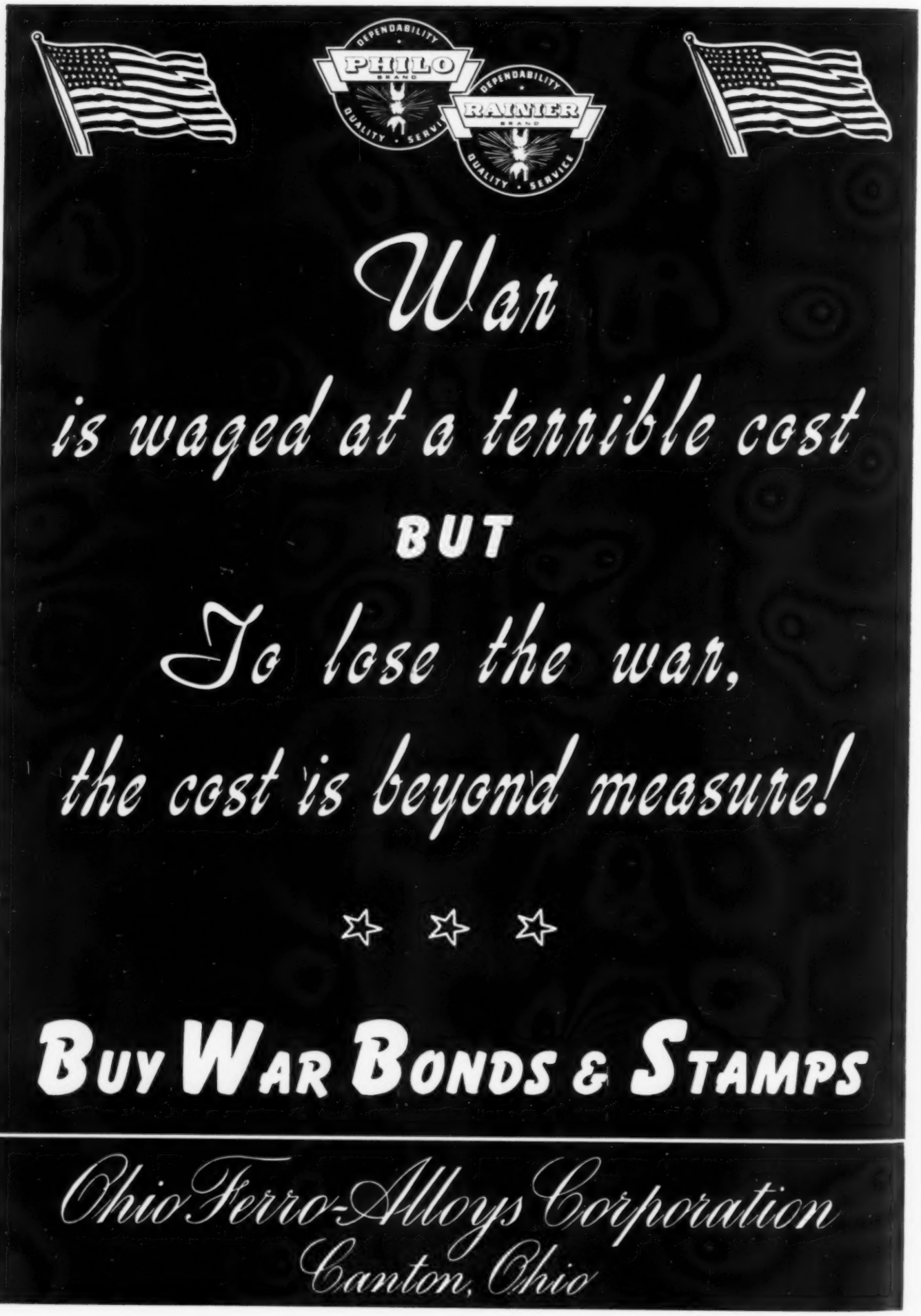
In these days of greater and greater production, Sly Filters are helping set new records. They offer these exclusive advantages: **(1) Greater filtering capacity because of more filtering cloth. (2) Taut bags (patented), at all times, saving power and resulting in quicker removal of dust. (3) Bags more easily replaced. (4) Automatic control (any degree) minimizing or removing the human factor. (5) Simpler shaker mechanism resulting in savings in maintenance and operation.**

Thousands of installations prove that Sly Dust Control soon pays its cost by increased efficiency of workmen, improved quality of products, and greater production. Write us fully so that we can tell you just what can be accomplished in your case.

THE W. W. SLY MFG. CO.

4753 Train Avenue **Cleveland, Ohio**

TUMBLING MILLS **SLY** **INDUSTRIAL DUST CONTROL** **BLAST ROOM EQUIPMENT**


DEPENDABILITY
PHILO
BRAND
QUALITY • SERVICE
DEPENDABILITY
RAINIER
BRAND
QUALITY • SERVICE
War
is waged at a terrible cost
BUT
To lose the war,
the cost is beyond measure!
BUY WAR BONDS & STAMPS
Ohio Ferro-Alloys Corporation
Canton, Ohio

(*Concluded from page* 110)

nected motor is 2 horsepower, 3 phase, 60 cycle, alternating current, 3600 revolutions per minute in 110, 220, 440 and 550 voltages. At normal rated capacity approximately 70 pounds No. 45 or 60 grit are handled per minute.

Indirect Light

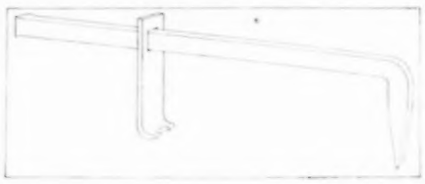
The Edwin F. Guth Co., St. Louis, has designed a new luminaire to provide the quality and refinement of indirect illumination with efficient economical fluorescent light sources. It is claimed the wide light spread eliminates the hot spot usually concentrated directly above, also permits wider spacings ideally suited for low installations. The light has a durable 300-degree white inner reflector for higher lighting efficiency. Ornamental stamped steel ends are welded to the upper half of the luminaire. Lower bottom of the fixture basin easily is removed for convenient installation or servicing. Accessories for the two 40, 65 or 100 watt lamps are joined to the under side of the reflector. The device is available with single or double stem hangers and can be mounted individually or in continuous rows with use of extra parts.

Riser Cutter

Linde Air Products Co., unit of Union Carbide and Carbon Corp., 30 East 42nd street, New York, has introduced a special turntable equipped with a preheating blowpipe and a cutting blowpipe for cutting small steel casting risers. It is claimed the turntable, shown in the accompanying illustration, requires a minimum amount of floor space. The turntable in this instance is a 3½-foot diameter steel plate ¾-inch thick, a ball bearing truck pinion and housing and a few readily available steel parts. It is assembled on a rear axle housing. Two rows of bolt holes around the edge are used for anchoring the jigs that hold the castings. The turntable is revolved at variable speed by a machine carriage mounted beneath in an inverted position. The drive wheel bears against the under side of the plate close to the edge. It is claimed that manganese steel risers 1 x 3 inches are cut at a speed of 12 inches per minute.

Flask Clamp

Klein-Farris Co., Inc., Boston, has developed a new type flask clamp as shown in the accompanying illustration. With this clamp it is

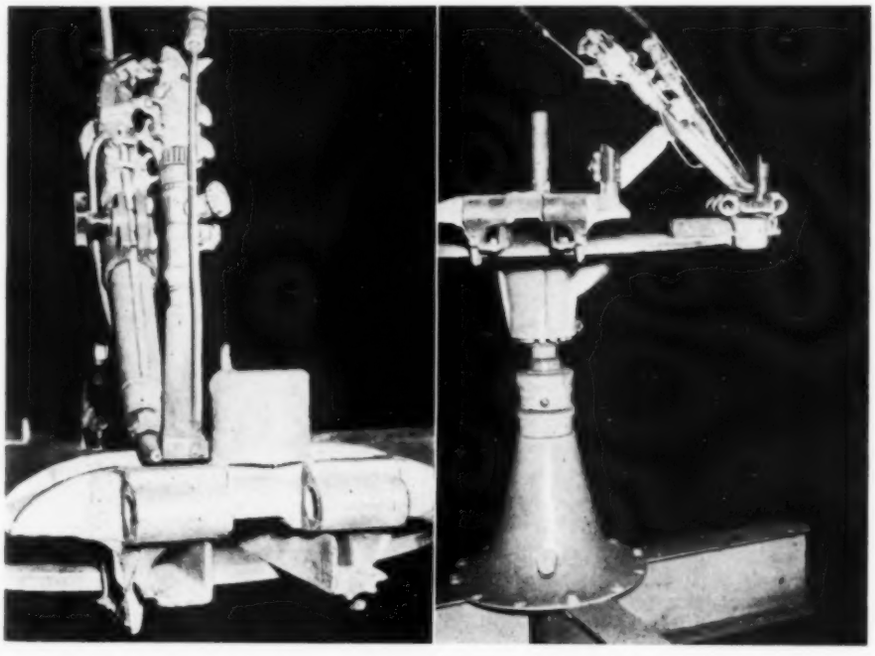


claimed the use of wedges or blocking is unnecessary. The clamp can be used on wood, iron or steel flasks. It is comparatively inexpensive and is easy to put on or take off. After the clamp toe has been fitted to the bottom board or plate and the lock adjusted on the top, the bar on the clamp is pulled back and fixed. The bar is flared at both ends to prevent the lock from slipping off the bar when the clamp is not in use. Clamps are available in several sizes.

Friction Saw

Kling Bros., Engineering Works, 1300 North Kostner avenue, Chicago, has introduced a new 36 and 48-inch friction saw with hydraulic feed

and main motor sizes of 40 and 75 horsepower. Trim and stream lined units as shown in the accompanying illustration are ruggedly built for constant heavy duty service. Other claimed features include high rim speeds, simplicity of saw change, constant parallel plane of saw rotation and elimination of end motion in swing frame. Frame is actuated by a double acting hydraulic cylinder through a 1½ horsepower motor and pump which deliver oil at constant pressure during the cut and at low pressure while the machine is idling. Rate of saw blade down stroke is adjustable up to 2.8 inches per second. Upstroke is fixed at 4.35 inches per second. Saw blade is shielded with a fabricated hood. A cooling system dissipates heat from the blade rim. Water and operating controls are in a pedestal in front of unit to permit clear vision. Finish pads are provided for suitable holding fixtures.



Cleaning Stone

Ideal Commutator Dresser Co., Sycamore, Ill., has developed a new cleaning stone for easily and quickly removing excess film and dirt caused by heavy, continuous power loads on commutators. The stone cleans while the motor or generator is running and is used by holding it against the commutator and moving it slowly across the face. It is claimed the stone does not clog or cut the commutator and in addition it cleans film from the brush seats and helps to re-seat brushes. The new cleaning stone also removes excess color, skin or film resulting from oxidation in paper mills, chemical plants, print departments, diesel locomotive generators, etc. It will also improve brush performance, reduce noise, even distribution of brush contact drop and brush wear and reduce chattering and sparking.

Belt Surfacer

Hammond Machinery Builders, Inc., 1605 Douglas Ave., Kalamazoo, Mich., recently has placed on the market a new modernly designed

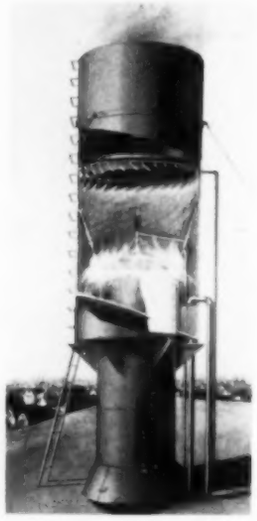
abrasive belt surfacer incorporating many improved features. The machine may be adjusted from vertical to horizontal position while it is running. Belt tension and tracking device also may be adjusted while running. The machine is totally enclosed and may be equipped with individual dust collector or for connection to an exhaust system. The abrasive belt pulleys are cast iron dynamically balanced, properly lubricated and running on dust proof ball bearings. The work table can be adjusted to any desired working angle and is available in bench or floor model. The new machine is equipped with tank and pump unit, or can be supplied with water main connection for wet grinding, polishing or surfacing. For dry operation it is necessary only to remove drain connection and attach air exhaust system. Vacuum cup drive pulleys on wet machines are claimed to eliminate belt slippage.

Electric Motors

General Electric Co., has developed three new motors, a vertical general purpose polyphase motor, a vertical shielded polyphase motor, 1 to 20 horsepower, and a vertical shielded single phase motor 1 to 5 horsepower. The compact cast iron frame and cover are designed to give added protection without adding to overall weight. Formex wire, new punchings and coil shapes, double end ventilation and balanced design contribute to long life. Accurate alignment of the motor to the driven unit is assured by machined rabbets on the stator frame and base. Deeply grooved bearings are encased in machined cast iron housings. Polyphase motors are available in either solid or hollow shaft construction. Single phase motors are available only in solid shaft construction.

Spark Arrestor

Whiting Corp., Harvey, Ill., has developed a spark suppressor to eliminate spark and soot nuisance from cupolas. Principle of operation in this new unit attached to the top of the cupola stack as shown in the accompanying illustration, is a double washing action that removes nearly all solids down a special drain pipe. There are no moving parts.



Advantages include elimination of fire hazard, clean roof, lowered maintenance cost and no complaints from dwellers in the neighborhood. In the majority of instances it is claimed city water pressure is sufficient, thus eliminating the need of an auxiliary pump.

Dust Collector

R. C. Mahon Co., Detroit, has developed a wet type dust collector designed for the collection of dust and chips resulting from burring and grinding magnesium alloy castings. The self contained unit, shown in the accompanying illustration, has bench and hood together with dust collection and ventilation equipment. The tank base is filled with water. Side extension forms a wood grillage bench, through which dust and chips are drawn. Large particles settle by gravity. The remaining dust and air at high velocity are forced downward against the water solution and create a bed of spray in the chamber which captures all dust. Exhaust fan and motor are mounted on top of the unit and discharge through a diffuser head either into the room or outside. Sludge is removed from the tank at periodic intervals. The machines, available either as single or double units, are

portable and require only electrical, water and drain connections.

Metal Cutting Saw

J. D. Wallace & Co., Chicago, has placed on the market a new metal cutting saw shown in the accompanying illustration with a new cast iron T-slot table assembly to hold materials of irregular shape, or for clamping a vise or fixture in any desirable position. With the motor unit and blade or abrasive wheel sliding on the radial arm the machine cuts metal or any other material, Other models are available for sawing wood or for general plant maintenance. The column, arm and motor rotate 360 degrees and has capacity for material up to 4 inches. Motors are up to 2 horsepower in single or three phase rating. Either saw blades or 3/32-inch thick abrasive wheels may be used, depending on the material to be cut.

Fanner

THE NAME
for
QUALITY
AND
SERVICE
in
CHAPLETS
AND
CHILLS

THE FANNER MANUFACTURING CO.

BROOKSIDE PARK **CLEVELAND, OHIO**

CANADIAN FANNER, LTD.
HAMILTON, ONTARIO

OVER a period of many years THE FOUNDRY has continued to point to the need for greater attention to the training of more men by the foundry industry. In periods of slack production the statement that the industry should train more men for the future usually brought forth the argument from numerous sources that there was not sufficient work on hand at the time to keep the available supply of skilled men employed, and that further training programs should not be considered until the need arose. Too often the industry seems to have heeded this advice. But the first marked pick-up in business usually resulted in shortages of manpower and this invariably led to the uneconomical practice of overbidding for employes of other plants. Generally these men were lost when the manager on the next street or in the next town bid higher.

The war program, in taxing the facilities of the majority of foundries in all four branches, has brought home the immediate need for more men with sufficient knowledge and skill to produce the enormous tonnage of castings required in less time than now is considered possible. William F. Patterson, chief of apprenticeship, U. S. Department of Labor, Washington, told the A.F.A. convention that "Because the products of foundries are indispensable to the operation of metal trades which must carry the main burden of war production, the labor supply and training situation of your industry are being watched with anxious eyes by all of us. Foundries must be operated during the emergency at maximum capacity; 24 hours a day. Without an ever growing flood of castings, our whole war production program is in jeopardy. Here then is the major contribution to the war effort that your industry must make: It must develop a labor force that can meet our war production needs. This can be done only through a comprehensive training program, and your association must take the lead in this. No adequate solution can be reached if we continue to deal with the problem as an individual plant or local basis. Time is short and each day production deadlines grow more pressing."

Judging from the requests for assistance which are reaching THE FOUNDRY office almost daily, the need for trained executives is even greater. More effort must be devoted to training foremen, melters, and metallurgists, to name only a few. The assistance which many steel foundries are giving to the war effort through the training of melters and other key men must spread to all plants operating today.

—□—

The news announcement which accompanied Amendment No. 3 to Supplementary Order M-21-a was so worded as to cause confusion among iron and steel foundrymen. The order refers only to *alloy* iron and steel. It provides that no alloy iron and steel may be melted or delivered to fill orders with ratings lower than A-1-k, except for certain national emergency and other low alloy steels, which may be produced for orders down to A-3 ratings. According to the order, *alloy steel* means any steel containing any one or more of the following elements in the following amounts: Manganese in excess of 1.65 per cent; silicon in excess of 0.60 per cent; copper in excess of 0.60 per cent; aluminum, chromium, cobalt, columbium, molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other alloying element in any amount specified or known to have been added to obtain a desired alloying effect. *Alloy iron* means any iron casting containing any one or more of the following elements in the following amounts: Manganese in excess of 1.65 per cent; silicon in excess of 5.00 per cent; copper in excess of 0.60 per cent; and aluminum, etc. as in the case of steel.

—□—

Various local foundry groups may find it necessary to hold fewer meetings during the months that lie ahead. For example, Henry C. Griggs of the Connecticut Foundrymen's Association writes that there will be no May and June meetings, due to gasoline rationing.

—□—

The Industrial Hygiene Codes committee of the American Foundrymen's Association, of which Jim Allan, International Harvester Co., Chicago, is chairman, should feel gratified over the praise that followed the presentation of the "Code of Recommended Practices for the Protection of Life, Property and Production in the Foundry Industry during the War". Rear Admiral C. H. Woodward, assistant director, civilian defense, has placed the stamp of approval of that organization upon the work. Recently, in writing to Mr. Allan, Admiral Woodward said: "You and your committee are to be highly complimented on the painstaking effort to translate for your industry the general information issued by the Office of Civilian Defense for plant protection. We believe you would be doing a service to your members if you supplied copies of the corrected code. For this purpose and in accordance with procedure adopted by the Office of Civilian Defense you are hereby permitted to use the legend 'Reviewed and Passed by the Office of Civilian Defense' on your code." The first section of the code was presented in the May issue of THE FOUNDRY starting on page 110, and the second section appears in this issue.

—□—

The matter of specifications for various types of castings will be given considerable attention at the annual convention of the American Society for Testing Materials, to be held in Atlantic City, N. J., June 22 to 26. In the past most of the castings specification work has been carried on by relatively few foundrymen. These men have done a good job and deserve the thanks of the entire foundry industry. The best way to show this appreciation, and at the same time do a job for the industry, in my opinion, is for many more foundries to have their men participate in the committee work of the A.S.T.M.

F. G. S.

STEEL WILL WIN THIS WAR

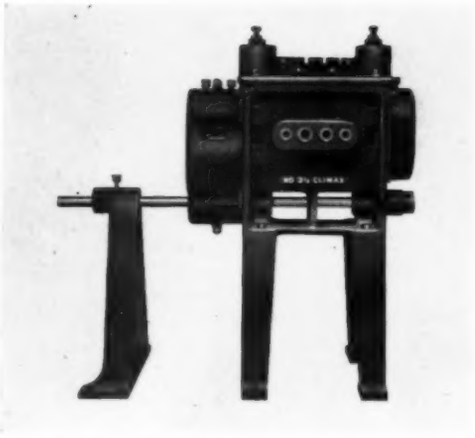
SO SAVE IT!

EVERY POUND of steel you save will contribute to our victory. We know of no better way to conserve steel than to re-use it.

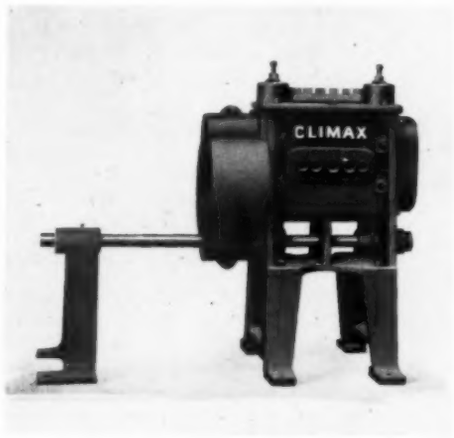
For re-using rods and wires, think of a Climax Wire Straightener. Rusted, twisted, and bent core wires can all be made usable again with the Climax.

The Climax Straightener is made in three sizes to handle wires from the smallest up to ¾-inch in diameter. It can be obtained motorized or equipped for flat belt drive.

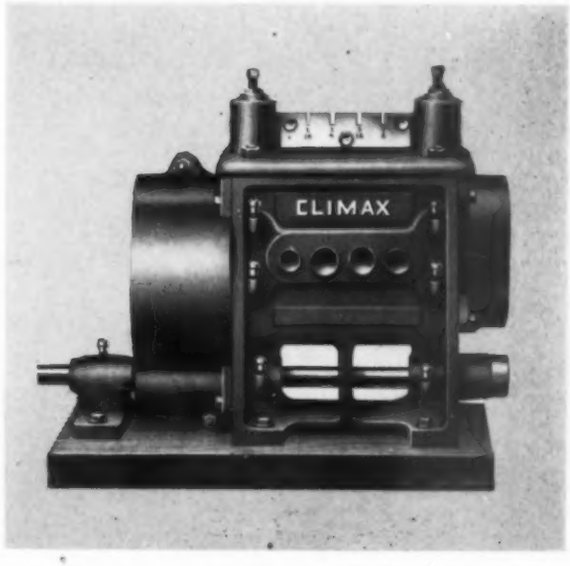
If you want to help the war effort—cut down on your purchases of hard-to-get core wires—write for details of the Climax Wire Straightener—now!



Model No. 2½ Climax for 4 sizes of wires. ¼" to ¾" inclusive.



Model No. 3 Climax for 5 sizes of wires. ¼" to ¾" inclusive.



Model No. 2 Climax for 4 sizes of wires. 1/16" to 1/4" inclusive.

THE FEDERAL FOUNDRY SUPPLY CO.

4600 EAST 71st STREET, CLEVELAND, OHIO

CHICAGO—CHARLEROI, PA.—CHATTANOOGA, TENN.—DETROIT—MILWAUKEE—MINNEAPOLIS—NEW YORK—RICHMOND, VA.—ST. LOUIS—UPTON, WYO.

FOUNDRY ORDERS SHOULD CARRY INFORMATION

(*Continued from page* 57)

Where the punched card method is used (Fig. 3) the weights and costs are punched in fields prepared in the tabulating section and totals mechanically obtained.

The regular operation card shown in Fig. 4 is used:

(1) To record the time and pieces made.

(2) As a medium for recording the job cost of labor and departmental burden, (overhead). Note: These amounts are entered on the bottoms of the cards.

Where the punched card method is used (Fig. 5) the recording for time and costs are punched in the fields prepared in the tabulating section and totals mechanically obtained.

The *Tumble* card shown in Fig. 6 is used:

(1) To record the weight of castings tumbled.

(2) As a medium for recording job cost of labor and departmental burden (overhead). Note: These amounts are entered on the bottom of the cards.

Where the punched card method is used (Fig. 7) the weight and cost are punched in fields prepared in the tabulating section and the totals mechanically obtained.

The *Shipped* card shown in Fig. 8 is used:

(1) To record the pieces and weight of castings shipped.

(2) As a medium for recording the cost of labor and burden covering activities in sorting, crating and handling castings preparatory to delivery to common carriers (railroad, truck, etc.). Note: These amounts are entered on the bottom of the cards to allow for peg board procedure.

Where the punched card method is used (Fig. 9) the pieces, weight and costs are punched in the field prepared in the tabulating section and totals mechanically obtained.

Three methods of preparing the orders include:

(1) Writing the statistical data separately on each form.

(2) Making carbon copies of the original writing.

(3) Preparing a master, or first copy, from which the additional copies are made by the use of reproducing equipment.

Writing the statistical data on each form wastes time and leaves too much opportunity for errors in transcription from the original copy. Making carbon copies of the original writing is a very rapid way of reproduction. However, unless light weight paper stock is used the last copies are likely to be hard to read, thus susceptible to misunderstanding and consequent mistakes in production or shipping. Light weight paper stock, with the usual hard usage given forms in a foundry, does not work as well as heavier materials.

Masters for reproducing copies may be made in various ways, such as tracings for blueprints, mimeograph, ditto, etc. The simplicity and flexibility of operation recommends the ditto process for this class of work and is therefore used in explanation of this plan for preparing production orders. Masters for reproducing by the ditto process may be made with carbon paper, typewriter ribbon, or pencil.

On receipt and acceptance of the customer's order for castings, a master form shown in Fig. 2 is prepared, showing: (a) Customer's name. (b) Customer's order number. (c) Pattern number. (d) Number of castings ordered. (e) Other statistical information necessary for an intelligent understanding of the customer's requirements. The positions of these entries are indicated by dotted lines on the illustrations.

When cost estimates for pricing have been prepared, as usually practiced, much of this information is taken from the estimate sheet the balance from information furnished by the customer's order, customer's drawing, analysis of pattern and core boxes or sample casting.

The top section of an estimate sheet is shown in Fig. 1. This estimate sheet provides for recording accurate and complete predetermined cost data and is simple to prepare when reliable cost information, concerning all marketing and manufacturing activities, is at hand. The author has observed and himself prepared tables or schedules of unit costs of these activities, based on actual marketing and manufacturing experience, that are helpful in predetermining costs to be recorded on the estimate sheet.

A production order number is assigned to the job and this number entered in the space provided at the top of the card. Placing the part number, customer's and company's order numbers at the top of the card facilitates its location in the file. Some companies tabulate their cost and statistical information by the use of a simple *peg board* by which statistical and cost information relative to individual jobs may be tabulated economically. For the benefit of those readers not familiar with peg board tabulating a brief description of its operation follows:

A peg board, as the name suggests, consists of a row of short pegs situated along the edge of a board in such a position that individual cards, with holes as indicated on Fig. 2, may be lapped so that statistical and cost information, recorded at the bottom of the cards, is visible, thus providing for speedy and accurate adding and tabulating.

Those companies may find it helpful to have the order number shown at the bottom of the card as well as at the top, so that, when the several cards are lapped on the peg board the order number of each is visible. This visibility allows for a quick glance at the order numbers to see that they are the same.

Scheduled starting and finishing dates for each operation together with the shipping date are entered on the cards, so that each reproduced working order may show this information, thus informing each employe who handles the work in the foundry when his part of the work is to be performed.

This method of issuing production orders is also adaptable to

(*Concluded on page* 121)

PUNCHED CARD METHOD

CUSTOMER - Name *The Blank Tool Company* Order Number *9675* Pattern No. *A645*

DESCRIPTION OF CASTING

100 Gear Housing
Their part no. 165
Their drawing no. 1374

DATE	SCHEDULED		
		Start	Finish
Ordered *3/10/42*	Cores	*3/16/42*	*3/18/42*
OUR ORDER *4760*	Molds	*3/19/42*	*3/23/42*
	Clean	*3/20/42*	*3/24/42*
	Ship		*3/25/42*

ACKNOWLEDGEMENT

Date *3/12/42*

We acknowledge, with thanks, receipt of your order and promise to ship as per scheduled date shown herein.

To be shipped via. *Penna R.R.*

To be invoiced to you at *$35.00* per *Casting*

F.O.B. *Foundry*

SIGNED (Company Name)

By (Individual) (Title)

Fig. 11—Punched type card for acknowledgement of customer's order

to help put the finger on

"Quisling" Castings...

Use Picker Concentrated X-ray Solutions

Here is a product that will help you bring out *all* of the radiographic detail in correctly exposed X-ray films.

Cracks, porosity, gas cavities and blow holes in metal parts and castings will show up with greater clarity if processed with Picker PX Concentrated X-ray Solutions.

All too frequently the splendid work achieved in the x-ray laboratory is 'sabotaged' in the darkroom. Old, weakened or improperly prepared developer and fixer can be directly responsible for ruining excellent radiographs.

The finest x-ray equipment, the freshest films and the most reliable technic are all to no avail unless the final step—film processing — is accomplished with active, uniform solutions.

When reordering processing chemicals, specify Picker PX Concentrated X-ray Solutions—and be sure.

PICKER X-RAY CORPORATION
300 FOURTH AVENUE • NEW YORK
WAITE MANUFACTURING DIVISION, CLEVELAND, O.

PICKER X-RAY CORPORATION
300 Fourth Avenue
New York, N. Y.

Gentlemen:

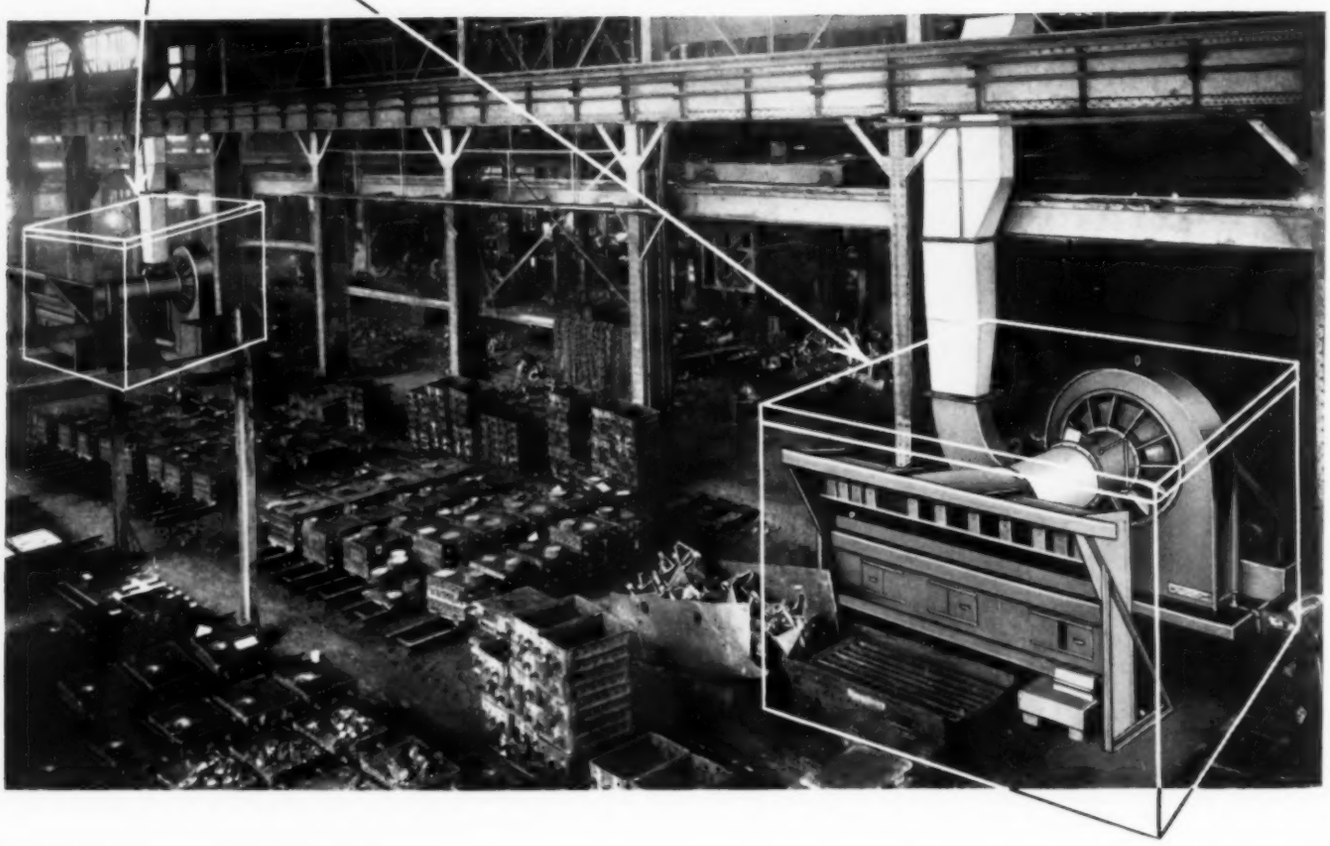
Please send me literature on Picker PX Concentrated Solutions.

Name_____

Title_____

Address_____

ROTO-CLONE *Packaged* DUST CONTROL *for Large Shakeouts*



DUST control at the shakeout is greatly simplified by the Type W Roto-Clone (Arrangement A) and a specially AAF designed Dust-Hood. Wherever overhead cranes deliver flasks to the shakeout as in the large steel foundry above, this Roto-Clone and Dust-Hood combination is ideal because of its space saving feature combined with highest overall efficiency.

Note that the dead area between the shakeout and crane columns is sufficient to accommodate the Roto-Clone combination unit. The Roto-Clone requires no Precleaner, and the collected dust is sluced to a catch basin under the floor, from which the water is drained off.

Write for complete information on the application of Roto-Clone to all foundry dust problems including shakeout, sand handling, mullers, screens, tumbling mills, abrasive cleaning, grinders, etc.

AMERICAN AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 266 CENTRAL AVE, LOUISVILLE, KY.
INCORPORATED

IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

(*Concluded from page* 118)

foundries employing punched cards for tabulating cost and statistical information. The form shown in Fig. 3 is suggested as a master and is made up in a similar manner as the form shown in Fig. 2 for a manually operated plan.

From this master shown in Fig. 3 statistics and operating instructions are reproduced on forms for: (a) Core making, molding, grinding, chipping, table sand blasting and any other operations to be performed on which time is measured as a basis for labor and burden cost calculation of a specific job. Fig. 4 shows manual and Fig. 5, punched card methods. (b) Tumbling or any other operation to be performed on which labor and burden cost calculation of a specific job is to be based on weight of castings processed. Fig. 6 shows manual and Fig. 7, punched card methods. (c) Shipping. Fig. 8 shows manual and Fig. 9, punched card methods. (d) Acknowledgment to customer of receipt of his order and notice of preparations for manufacture of castings specified thereon. Fig. 10 shows manual and Fig. 11, punched card methods.

Uniform statistical information and operating instructions relative to the specific job are now shown on each form. The name of the operation is then written on each reproduced operation order (except shipping and acknowledgment copies). The shop forms are delivered to the several departments to serve as written authority for performance. The acknowledgment copy being mailed to the customer so that corrections may be made for possible errors or misunderstandings, thus reducing scrap losses that might be caused by such errors and misunderstandings.

Additional cards are prepared as needed for recording production and costs of castings made on succeeding days. Many times the number of cards needed for the entire order can be closely estimated and reproduced when issuing the order, thus saving the effort in preparing them singly.

Employes of Johns-Manville, Waukegan, Ill., held an all-out-for-war-production rally on Sunday night, April 5, as part of the nation wide war production drive which is being held in each of the 17 factories, mines of that organization. The drive is in line with the appeal to industry by Donald M. Nelson, War Production Board chairman, for increased war production. Central committees composed of management and employe representatives have been appointed. Principal speaker at the Waukegan rally was Lewis H. Brown, president, Johns-Manville Corp.

Salt Will Prevent Heat Sickness

Until recently, one of the baffling and serious causes of disability among workers has been heat sickness or heat cramps, particularly prevalent among those engaged in hot, heavy work. In its milder forms, heat sickness often is not recognized as such, showing up as a loss of energy, increased fatigue, or a general letdown in productive output.

Research has shown that loss of salt from the body, through excessive sweating, is at the bottom of the trouble. Every body cell, the blood stream, the spinal cord, and the brain, must contain a certain amount of water to maintain proper chemical balance necessary for normal body functions. Unless salt is present in the proper quantities, various parts of the body cannot hold the necessary amount of water. When body salt is lost through excessive sweating and not replaced promptly, cells and other parts of the body lose water, upsetting the delicate chemical balance of tissue and body fluid. If the salt loss is slight, the first reaction will be a tired, uncomfortable letdown feeling. If this upset condition is allowed to continue, actual heat sickness and muscle cramps occur, which are capable of causing death in extreme cases. Salt serves another important function by uniting with undesirable chemicals in the blood stream, transforming them to substances which can be thrown off through the bowels and kidneys, thus ridding the body of materials which might prove harmful if allowed to remain.

Salt Loss Saps Energy

Even a slight salt loss saps energy and slows up muscular co-ordination and reactions. When this happens, men feel tired and uncomfortable, mistakes increase, individual producing capacity goes down; and, as strength and efficiency are undermined, men become careless and serious accidents easily can happen. To prevent these unnoticed, but highly dangerous cases, salt lost through sweating or other bodily functions should be replaced at the same time and in the same ratio as the loss. Unfortunately, our bodies do not store away extra salt for future use, but dispose of it almost immediately through the kidneys. To keep the body salt up to standard, a certain amount must be secured each day. The average person can obtain the necessary daily quota from the salt used in seasoning food, but workers engaged in heavy work or long hours must have extra salt to compensate for the loss through sweating.

It is generally agreed by industrial physicians that the average worker, during the day, needs one level teaspoon of salt for each gallon of water he drinks. Since workers in even the hottest jobs will rarely drink more than two gallons of water during an 8-hour day, the extra quota required is approximately two level teaspoons, approximately 60 per cent more than the average diet contains. Men not on hot jobs will consume from two quarts to a gallon of water during the day and need half to a full teaspoon of salt, from 10 to 25 per cent more than the salt content of the average diet.

Various methods are employed to supply salt to workers. Some plants add the proper percentage of salt to drinking water systems. This method, while entirely satisfactory, involves the installation of machinery and some attention to insure that the proper amount of salt is present in the water. The use of salt tablets and tablet dispensing machines, placed near drinking fountains or on portable water coolers, has become increasingly popular. Tablets contain regular table salt, compressed under pressure to a uniform 10-grain size, which is approximately the size of an aspirin tablet. They are swallowed whole with a drink of water. No salt taste is noticeable and the tablets dissolve within 30 seconds after being swallowed.

Educational posters, placed on bulletin boards and near drinking fountains, are used to point out to workers importance of replacing salt lost through sweating, and encourage them to take salt tablets, throughout the day, whenever they take a drink of water. Eight 10-grain tablets are the equivalent of one level teaspoon of salt, which means that workers engaged in light to medium work will require from 4 to 6 tablets daily; workers in medium heavy work from 8 to 10 tablets; and workers in extra heavy, hot work from 12 to 15 tablets during an 8-hour day. Salt tablets can also be obtained with 70 per cent salt and 30 per cent dextrose for extra energy.

Twentieth Century Fund, 330 West Forty-second street, New York, recently has issued a 158-page booklet entitled "Postwar Planning in the United States" by Dr. George B. Galloway. The book is a survey of more than 100 government and private agencies and commercial firms throughout the United States which are engaged in postwar planning research. The report catalogs leading agencies, lists and classifies the projects each has underway, and includes a bibliography of current books, pamphlets and articles on postwar planning. Copies may be obtained from the organization for 60 cents.

activities of foundry groups

Birmingham

BIRMINGHAM District Chapter of the A.F.A. held its regular monthly meeting at the Tutwiler Hotel, Birmingham, on April 17. Chairman J. A. Bowers, American Cast Iron Pipe Co., presided. A. L. Holberg, Alabama Clay Products Co., announced one new member, W. R. McKee, Stockham Pipe Fittings Co.

H. J. Noble of the nominating committee, announced the following as having been nominated for officers and directors: Chairman, E. A. Thomas, Thomas Foundries Inc.; vice chairman, W. Carson Adams, Carson Adams Coal & Coke Co.; secretary-treasurer, Howard Nelson, Hill & Griffith Co.; directors to serve 3 years, A. S. Holberg, J. A. Bowers, J. M. Franklin, and Thomas Bellsnyder. B. W. Norton was nominated to serve as director for 1 year.

George Vann introduced the speaker, F. M. Johnson, sales manager in charge of air conditioning, Surface Combustion Corp., Toledo, O. Mr. Johnson gave an excellent talk on dry blast for cupolas and blast furnaces. The 35 members and guests present took advantage of the opportunity to discuss the problem with Mr. Johnson following his talk.—*M. W. White, acting secretary.*

Western Michigan

ANNUAL business meeting of the Western Michigan Chapter of the A. F. A. was held May 4 at the Ferry Hotel, Grand Haven, Mich. About 120 members and friends were present for dinner which was followed by several acts of vaudeville staged by the supper club of the hotel. Chairman D. F. Seyferth, West Michigan Steel Foundry Co., Muskegon, Mich., then assumed command and the more serious part of the program was attended to. Robert E. Kennedy, secretary of the A. F. A. was present at the meeting to see that the trophy for winning the membership drive was properly presented to the chapter by Chris Jensen, who was responsible for bringing it back from the convention in Cleveland.

The following men were unanimously elected to serve as directors for 3 years: D. F. Seyferth, West Michigan Steel Foundry Co., Muskegon; R. A. Clark, Lakey Foundry & Machine Co. Inc., Muskegon; Max A. Amos, Standard Automotive Parts Co., Muskegon; and J. L. Brooks, Muskegon Piston Ring Co., Sparta Division, Sparta, Mich. The board of directors then held a short meeting and elected the following officers to serve the coming year: Chairman, C. J. Lonnee, Muskegon Piston Ring Co., Sparta Division, Sparta; vice chairman, A. E. Jacobson, Grand Haven Brass Foundry, Grand Haven; secretary, K. C. McReady, Muskegon Piston Ring Co., Sparta Division, Sparta; treasurer, C. H. Cousineau, West Michigan Steel Foundry Co., Muskegon, Mich.

Pat Dwyer, engineering editor of THE FOUNDRY, then spoke on "Gates and Risers," giving the foundrymen a concise and practical talk on the application of different types of gating to different jobs coming up in the foundry from day to day. The

(*Continued on page* 124)

Wisconsin Chapter's foundry conference held in the Spring was a huge success as indicated by this banquet photo

WAR-TIME ADVERTISING: "A means of getting information from where it is to where it is needed; quickly; accurately; economically."

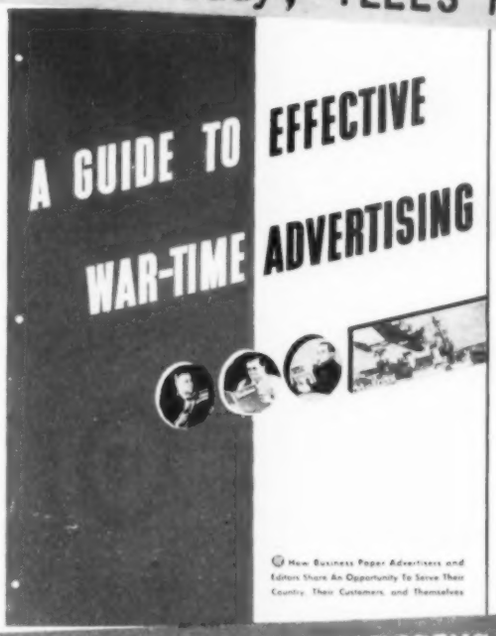
HOW TO MAKE YOUR ADVERTISING HELP OUR WAR EFFORT

MUCH advertising has to CHANGE to work TODAY!

FREE MANUAL, now ready, TELLS HOW.

90 PAGES OF PRACTICAL HELP

Demonstrates, by example, how your advertising, too, can help fight this war; help customers; help build a sound foundation for future business.


A GUIDE TO EFFECTIVE WAR-TIME ADVERTISING
How Business Paper Advertisers and Editors Share An Opportunity To Serve Their Country, Their Customers, and Themselves

WANT FACTS?

No chronicle of theories and opinions, this. "A Guide to Effective War-Time Advertising" is a factual report based upon the testimony of business leaders who have found ways to make their advertising helpful to their customers and prospects at a time when help is so desperately needed. It shows, too, now "oversold" companies now use "service advertising": how they do as the business paper editors do...use their space to transmit important information from where it is to where it is needed.

☆

We have to use EVERYTHING WE'VE GOT to win this war!

Good business papers are multi-purpose carriers that can convey important messages quickly, accurately, economically, to special groups of men with kindred war-time problems. America, the world's greatest user of these vehicles of communication, has a powerful tool to use against the Axis. By making the best possible use of business papers, now, we can strike a blow that will be felt across both oceans. "A Guide to Effective War-Time Advertising" will help you do this. One copy is yours for the asking...if you'll ask before they're all gone.

ABP

A national association of business publications devoted to increasing their usefulness to their subscribers and helping advertisers get a bigger return on their investment.

EXAMPLES OF SOUND, SHIRTSLEEVE ADVERTISING.

After you read this "Guide", you will have a new concept of what advertising can do to help America's war effort and to help your company solve its customer-relations problems, present and future. And you will know what good "institutional" advertising is!

The "Guide" features advertisements that show some recognition of the conditions which today have increased rather than lessened the need for making business paper advertising useful, informative and specific!

This "Guide", while comprehensive in itself, is only our introduction to a collection of case studies that will constitute a veritable WAR ALBUM. Send for it now and you'll receive additional up-to-the-minute case studies, free, as fast as they're produced.

FREE

Associated Business Papers,
Dep't. 2746, 369 Lexington Avenue,
New York City

Please send, without obligation, my free copy of ABP's latest aid to advertisers, "A Guide to Effective War-Time Advertising."

Name_____

Position_____

Company_____

Street_____

City & State_____

(*Continued from page* 122)

talk was illustrated with slides and presented in such a manner that no one could fail to understand the subject matter.—*Max A. Amos, secretary-treasurer.*

Pittsburgh

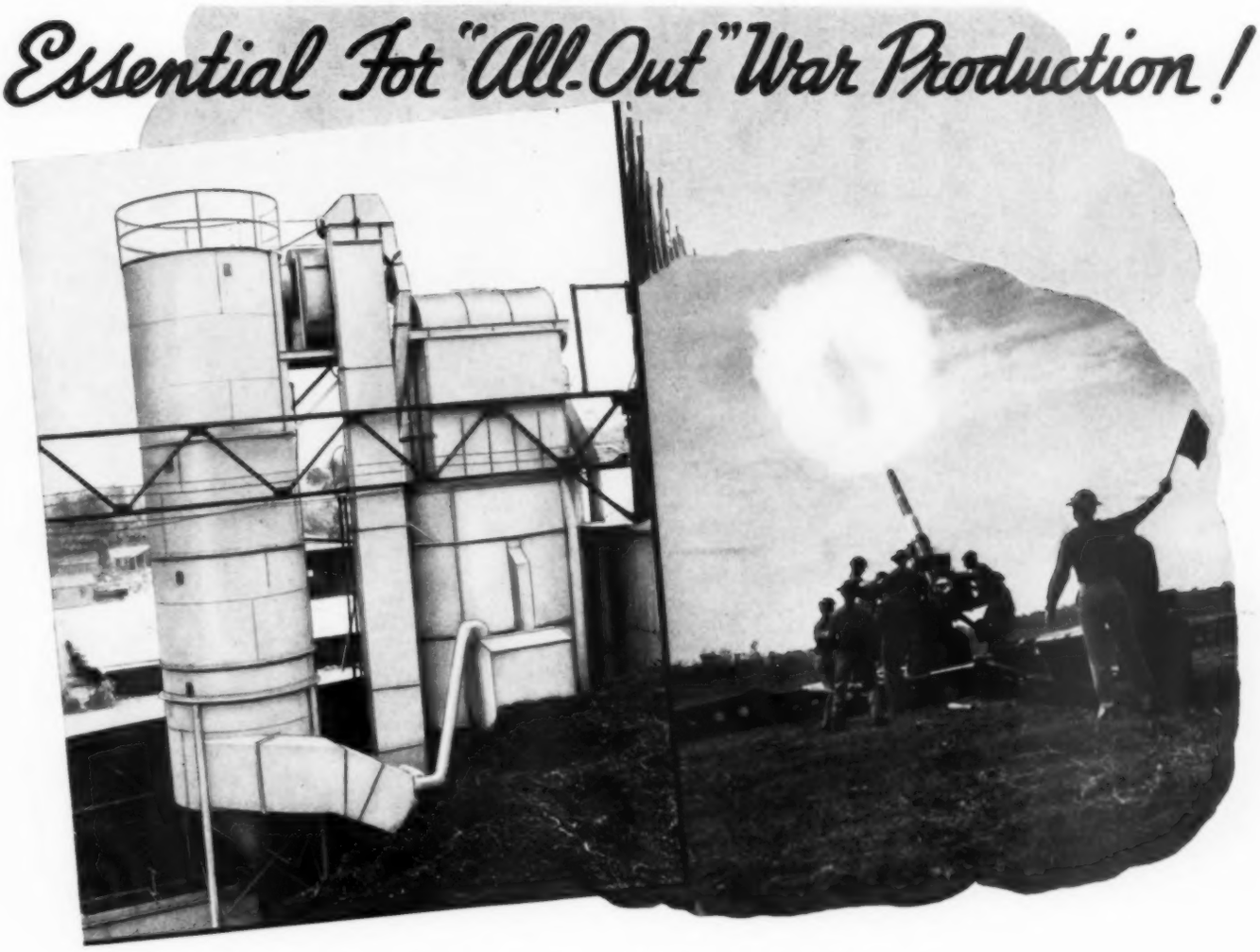
ELECTION of officers was held at the May meeting of the Pittsburgh Foundrymen's Association. W. H. Satterfield, Pittsburgh Steel Foundry Corp., Glassport, Pa., was elected president for the fiscal year beginning July 1, 1942, E. C. Buerkle, National Bearing Metals Corp., Pittsburgh, was elected vice president, Ferdinand G. Schultz, F. G. Schultz Co., Pittsburgh, secretary-treasurer. Executive committee members are as follows: C. J. Scheckhaus, Union Spring & Mfg. Co., New Kensington, Pa.; Harry Kennedy, Continental Roll & Steel Foundry Co., Coraopolis, Pa.; W. J. Laird, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; T. A. Reynolds, McConway & Torley Corp., Pittsburgh; and H. P. Spilker, Sterrit-Thomas Foundry Co., Pittsburgh.

Steel casting production during the war emergency, with special emphasis on the technique used to replace alloy content, was discussed by Dr. C. H. Lorig, Battelle Memorial Institute, Columbus, O. Dr. Lorig stressed importance of hardenability data in the determination of properties of the finished casting, and described research on hardenability and its relationship to heat treatment and quenching technique. Citing the fact that castings weighing up to 85,000 pounds have been quenched successfully, the speaker stated that more economical equipment for heat treating large castings is being developed as a result of our war effort.

By means of data curves, Dr. Lorig showed how proper carbon content and proper heat treating technique can be made to replace the use of alloying elements to obtain desired physical properties. Type of treatment, rate of quench and carbon content determine hardenability as readily as does alloy content, with the possible exception of a quench below the critical rate. Under such conditions the alloy content can be expected to show better results.—*R. L. Hartford.*

Nearly 1000 attended the annual Ladies Night party of the Chicago Chapter held April 11 at the Morrison hotel

Essential For "All-Out" War Production!



Schneible Multi-Wash Dust Collectors are *the only dust collectors that completely fill the 24-hour day, seven day week, operating schedules that are needed for today's war production of castings.* Here are the reasons why:

(1) Multi-Wash Collectors need no shutdown periods for shaking down and removal of collected dust.

(2) Multi-Wash Collectors need no down time for lubrication, maintenance or repairs. (They have no parts to break, burn, clog or rapidly wear.)

(3) Multi-Wash Collectors will operate 168 hours weekly, year in and year out without need for shutdown.

Does your present dust collection equipment give you this highly efficient service? If it doesn't, investigate the Multi-Wash System. Let us furnish you installation and operating cost facts on Schneible Dust Collectors and Systems — write or wire for details.

CLAUDE B. SCHNEIBLE COMPANY

3953 Lawrence Ave., Chicago

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SCHNEIBLE

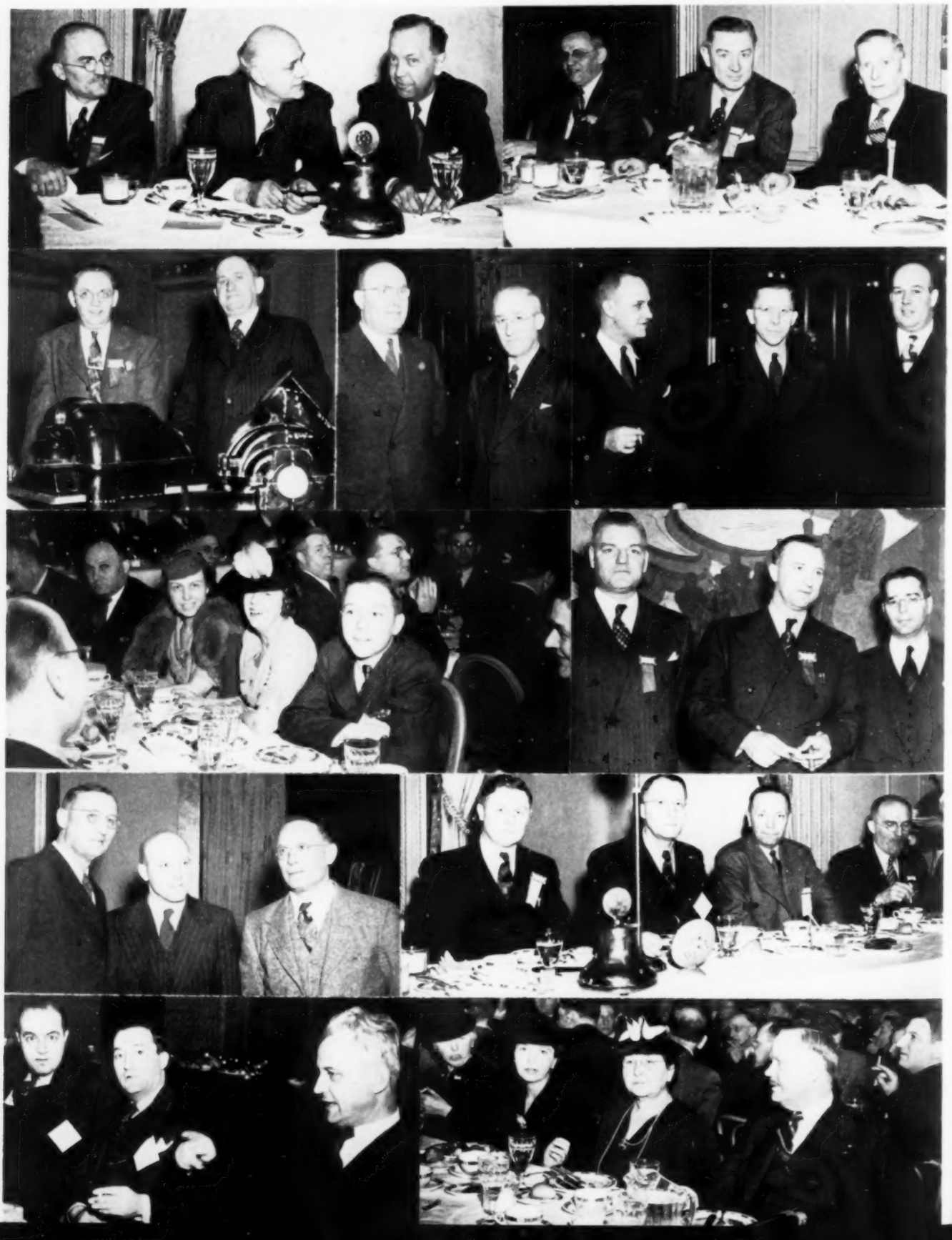
Toledo

LAST meeting of the Toledo Chapter of the A. F. A. for the 1941-42 year was held at the Hillcrest Hotel, Toledo, May 9. Robert E. Kennedy, national secretary of the A. F. A. was present to commend the Toledo Chapter for its accomplishment in the membership drive. C. F. Carson, who was one of the representatives of the Toledo Chapter at the national convention, presented the second prize bell won by the chapter in the membership drive.

Annual election of officers was held and the following were elected: Chairman, C. F. Carson, National Supply Co., Toledo; vice chairman, Roy Clark, Toledo Machine & Tool Co., Toledo; secretary-treasurer, Robert T. Jansen, Unitcast Corp., Toledo. H. H. Widler, Detroit Stoker Co., Monroe, Mich.; Floyd F. Ensign, Ensign Foundry Co., Toledo; and

(Continued on page 128)

A highly successful enterprise, the Wisconsin conference showed a registered attendance of 510, and nearly 700 at the annual dinner. Photos courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee



Now Ready!

Revised, Third Edition

"ELEMENTARY FOUNDRY TECHNOLOGY"

★ Revised and brought up-to-date with a completely new chapter on malleable cast iron foundry practice, the Third Edition of "Elementary Foundry Technology" will soon be ready for distribution.

Fundamental data on both foundry practices and those related subjects of importance to foundrymen are thoroughly covered for use of apprentices and young men studying modern foundry operation and management.

This book contains material conforming to the requirements for instruction as set up in the minimum standards of four year foundry apprenticeship in the United States. It is sponsored by the National Founders Association, Chicago.

In addition to the completely new chapter on malleable cast iron foundry practice, the chapter on pig iron is revised to make it conversant with present day practice. Additional references are included.

Well over half of the book is devoted to discussion of fundamentals of foundry practice, with special reference to the field of gray iron and steel manufacture. Foundry subjects covered include . . . Elements of Iron . . . Iron Manufacture . . . The Cupola and Its Operation . . . Elementary Problems in Steel Foundry Production . . . Brass Melting . . . Foundry Sands . . . Gates and Risers . . . Molding Machines . . . Core Machines . . . Long Life Molds . . . Malleable cast iron foundry practice.

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"Elementary Foundry Technology", by L. A. Hartley; Third Edition revised by Edwin Bremer and Pat Dwyer; 377 pages; 6 x 9 inches; 132 illustrations, 16 tables; includes glossary, index and bibliography; sponsored by the National Founders Association, Chicago; Price $3.00, postpaid; Published by The Penton Publishing Co., Cleveland.

(*Continued from page* 126)

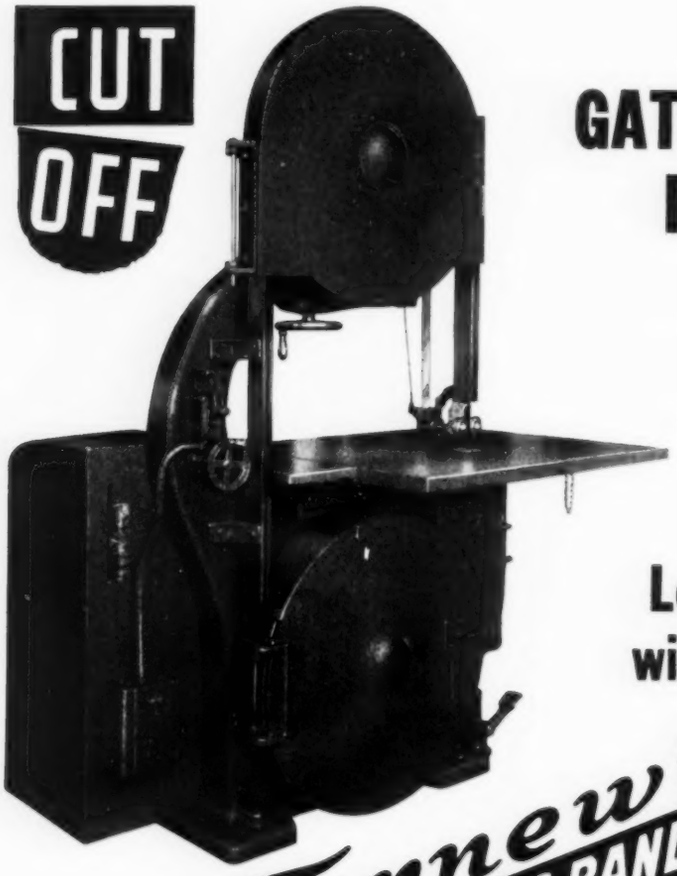
W. A. O'Brien, Electric Auto Lite Co., Fostoria, O., were elected directors to serve 3 years. Directors elected for a 2-year term are: L. M. Long, Bunting Brass & Bronze Co., Toledo; R. L. Binney, Binney Castings Co., Toledo; and W. C. Adler, Ohio Steel Foundry Co., Lima, O. Those elected to serve as directors for 1 year are: Leslie Brown, Magnesium Fabricators Division of Bohn Aluminum & Brass Corp., Adrian, Mich.; W. F. Erler, Modern Pattern Works, Toledo; V. E. Zang, Unitcast Corp., Toledo, retiring chairman of the chapter.

A general question and discussion period on pertinent foundry problems followed. Slides were shown by V. E. Zang on pattern equipment and the method used by his plant in producing lever castings by welding. —*G. W. Buchanan.*

Wisconsin

THREE hundred seventy foundrymen with their wives and guests relaxed a bit from wartime production programs and thoroughly enjoyed themselves at the first dinner dance to be sponsored by the Wisconsin Chapter of the A. F. A., the dance was held April 17 at the Shroeder Hotel, Milwaukee.

Dinner dancing held sway until 9:30 when the floor show entertained the group for 45 minutes. This was followed by some old-time dancing, mixed in with lessons of some of the newer dances. The event was successful to the extent that those who attended are clamoring for another party in 1943, which is probable, providing it does not interfere with the war effort next spring.—*George K. Dreher, secretary.*



GATES and RISERS in any metal

in far Less Time with

Tannewitz METAL CUTTING BAND SAWS

Variable Speed

Models to fit Every Need

In addition to our regular High Speed Band Saws delivering over 2 miles of smooth vibrationless saw travel per minute, which have proved so exceedingly popular in automotive and aviation work, the TANNEWITZ line now offers five other models to provide the fastest cutting medium for every foundry need: a 30" machine to provide any speed from 300 to 900 blade feet per minute—a similar machine with 3-step V-belt drive to give 2300, 3100, 4000 blade feet per minute—a 36" machine with 32" capacity under the guide—a model with 48" wheels and one with 52" wheels, operating at 3,000 blade feet per minute for handling extra large castings. Get a line on the TANNEWITZ metal cutting band saw that fits your particular needs. It will save time, step up production and repay its cost dozens of times. Write for full particulars NOW!

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

Western New York

FINAL business meeting of the season for the Western New York Chapter of the A.F.A. was held Friday, May 1, at the Touraine Hotel, Buffalo. Al Sigl, newspaper man and radio commentator, who talked to the group in Rochester at the April meeting, retold his stirring story about the Legion of Blood Donors which he founded some years ago. Edwin C. Barringer, president and executive secretary of the Institute of Scrap Iron and Steel, Washington, was the principal speaker. He really put all his cards on the table and told the group the story of scrap. His true picture of the scrap problem today and tomorrow made his one of the most interesting talks of the season.

June 20 has been set as the date for the chapter's annual picnic.—*Eliot Armstrong, secretary.*

Southern California

REGULAR April meeting of the Southern California Chapter of the A. F. A. was held at Scully's Restaurant, April 28, with 93 present. The meeting was called to order by B. G. Emmett, the chapter's president. Report on new members was made by the secretary, W. D. Bailey Jr., in the absence of Chairman Effinger. Report on the convention was given by Leonard Hofsteader, H. C. Donaldson Co.

Nominating committee's report was presented by past president, James E. Eppley. Officers nominated are as follows: President, Earl Anderson, Enterprise Iron Works, Los Angeles; vice president, Walter Haggman, Foundry Specialties Co., Huntington Park, Calif.; secretary, E. M. Hagener, General Metals Corp., Los Angeles; treasurer, W. D. Bailey Jr., Westlectric Castings Inc., Los Angeles. The following were nominated directors: Fred C. Edmison, Mechanical Foundries Inc., Los Angeles; A. H. Popperwell, Re

liable Iron Foundry Inc., Los Angeles; Dominic Meaglia, American Foundry Co., Montebello, Calif., Charles R. McGraw, Long Beach Brass Foundry, Long Beach, Calif.; Robert R. Haley, Advance Aluminum & Brass Co., Los Angeles, and J. Donald Locke, Long Beach Iron Works, Long Beach.

Speaker of the evening was R. E. Brown, West Coast manager, Electro Metallurgical Co., whose subject was "Keeping Quality of Cupola Cast Iron to a Maximum with Materials Presently Available." After this interesting talk, Richard Hughes presented a picture showing recent war developments.—*W. D. Bailey Jr., secretary.*

Minnesota U.

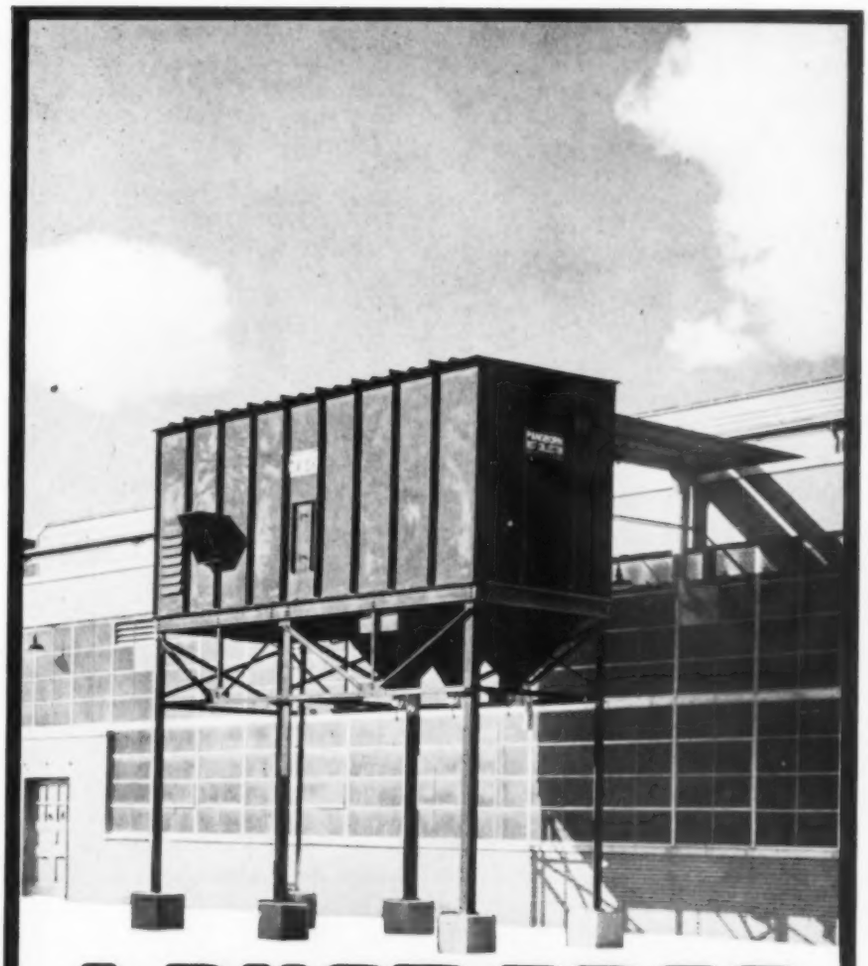
A JOINT meeting of the Twin City Chapter of the A.F.A. and the University of Minnesota Student Chapter of the A.F.A. was held May 4, at Coffman Memorial Union, University of Minnesota, as a celebration of the first anniversary of the founding of the student group.

Dinner preceded the evening feature, which was the presentation of an illustrated talk on "The Story of Silvery Pig Iron," by Bradley H. Booth, metallurgist, Jackson Iron & Steel Co., Jackson, O. Mr. Booth gave an excellent resume of the history of silvery pig iron, and concluded with a description of the new blast furnace now being erected at Jackson Iron & Steel Co. At the conclusion of the talk, all those present were able to inspect a collection of raw materials and completed pig irons which Mr. Booth brought with him.—*Sidney S. Silberg, secretary.*

Metropolitan

FINAL meeting of the current season for the Metropolitan Chapter of the A.F.A. was held Monday, May 4, at the Essex House, Newark, N. J. A large turnout was present to hear Leroy P. Robinson, Werner G. Smith Co., Cleveland, emphasize the importance of strict core room control in his talk, "Variables Which Affect the Proper Baking of Cores". In addition the group was shown the color motion picture on "Sand" presented by the Whitehead Bros. Co. Mr. Robinson was presented by G. E. Hadzima, Robins Conveying Belt Co., who was technical chairman of the evening.

There are many variables introduced into core making which materially affect the finished product,



A DUST FREE PLANT

WILL PRODUCE MORE WORK FOR VICTORY!

NOW—more than ever, it is essential to keep men and machines at capacity production by maintaining working conditions at their peak to eliminate lost time.

Pangborn Dust Control systems are doing this job—effectively and economically—in both war and civilian industries. Men, machines and materials are safe from Dust menace when protected with Pangborn installations. A dust-free plant will produce more work for VICTORY. Write.

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WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT

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and which, according to Mr. Robinson, could be eliminated by more conscientious control. Good cores must be made from properly mixed sand, properly baked. The baking ovens must be in proper operating condition. Dirty oven flues, incorrectly installed and improperly calibrated pyrometers and ovens of uneven temperature will not produce good cores.

Mr. Robinson stated that there is nothing gained in adding more cereal binder or more core oil than is recommended. Core sand should be stored in a sheltered spot to prevent water pickup from rain. Before mixing, it should contain only a per cent or two of moisture. For best results the sand should be mixed in this order: Dry sand, cereal binder, water, and finally oil. The sand should be mulled sufficiently long to attain optimum physical properties, but no longer since the tensile strength will drop off rapidly.

In closing, it was pointed out that rigid inspection of the cores and rejection of poor cores will be paid for with the reduction of scrapped castings.—*R. E. Ward, assistant chairman, publicity committee.*

Simplicity

FOUNDRY EQUIPMENT

hold a key position in casting production

This is shown by the statements recently made in writing by many of our users. Shown below are a few excerpts from some of these letters.

★ ★ *"I sincerely believe that without the use and continued operation of the Simplicity shake-outs now in our plant, that it would lower our production between ten and twenty percent."*

★ ★ *"Your machines not only save labor during the shake-out operation, but we find the greatest savings in flask equipment and the castings come truer to form, particularly when shaken out hot."*

★ ★ *"We believe the Simplicity Equipment is one of the most vital in the Foundry Industry today."*

★ ★ *"We are using your Portable Screening and Conditioning Unit and couldn't do without it under the present conditions. In fact we saved the price of the machine in six months time on man hour savings alone."*

SIMPLICITY ENGINEERING CO.

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Cincinnati

FOUNDRY coke and cupola operation was the topic of discussion at the May 12 meeting of the Cincinnati District Chapter of the A.F.A. held at the Netherlands Plaza hotel, Cincinnati. Approximately 40 members and guests were present and W. M. Ball Jr., Edna Brass Mfg. Co., Cincinnati, and chairman of the chapter presided.

In the brief business meeting immediately following dinner, Chairman Ball announced the chapter's annual stag outing to be held June 16 at the Hyde Park Country Club. He also reported for the nominating committee, presenting eight names from which four directors will be elected at the June meeting.

The speaker, B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, gave a well organized and interesting paper on foundry coke and its relation to cupola melting. Mr. Mulcahy illustrated his talk with slides and samples of coke. He presented the subject as follows: Process of manufacturing three sizes of foundry coke; physical and chemical characteristics of coke; theory and practice of cupola melting, and concluding with questions and answers. The interest of the audience was evident by the spirited discussion.—*Henry M. Wood, secretary.*

Adventures of Bill

(*Continued from page* 83)

and to be hard close grain metal. Machining allowance all over is $\frac{1}{16}$-inch.

"With proper attention to detail, a satisfactory casting can be produced from either a horizontal or vertical mold. In the horizontal mold a pouring basin, preferably dry sand, and a single sprue near one end of the cope deliver metal to a long runner in the cope face of the mold joint. This runner covers three shallow gates in the drag 2 inches wide tapering in depth from $\frac{1}{2}$ inch at the back to $\frac{1}{8}$-inch at the entrance to the mold. A 1-inch show up riser is placed on top at each end of the mold.

"In an alternative method for a narrow flask, a long pouring basin is built on top of the cope and delivers metal through a straight row of six $\frac{1}{4}$-inch pencil gates along the highest part of the casting. A simpler method and one which does not require a cope with the bars cut to conform to the shape of the pattern, is to make the mold in a vertical position. The sand must be rammed a little harder than usual around th lower part of the pattern to prevent the mold from straining when filled with metal. This type of

strain frequently causes the metal to sink at the top and leads to the erroneous conclusion that the metal is responsible for shrinkage defects on top of the casting. Unless the sand is highly permeable, it will be necessary to run a row of vent wire holes in the drag, about 2 inches from the pattern.

"In this type of mold the metal is poured into a ring basin on top of the cope. The metal flows into the mold through six ¼-inch pencil gates set perfectly upright to prevent the metal from impinging on the wall of the mold or core. Recommended composition of the charge with 20 to 50 per cent steel is silicon 1.50 per cent, chromium 0.60 per cent, nickel 2.75 per cent. To attain tensile strength of 42,000 pounds per square inch the casting is oil quenched at 1575 to 1700 degrees Fahr. and drawn at a temperature between 800 and 1100 degrees Fahr."

Book Review

Proceedings of the Forty-Fourth Annual Meeting, A.S.T.M., Vol. 41, 1941, cloth, 1380 pages, 6 x 9 inches, published by the American Society for Testing Materials, 260 South Broad street, Philadelphia, and available in cloth to members for $6 and to nonmembers for $9.

This annual volume opens with the summary of proceedings at the forty-fourth meeting of the society held in Chicago in June 1941. Following President W. M. Barr's address, "Speed, Specifications and Safety," reports of the executive committee and auditors are given. Complete and detailed reports of the society's standing committees are presented and comprise 448 pages of the volume. The Edgar Marburg lecture, which discussed "Natural and Synthetic Rubbers," by Harry L. Fisher, and the other technical papers are presented with their discussions. The volume concludes with a complete subject and author index.

Change Brass Valve Specifications

Emergency alternate federal specifications recently have been issued on 150-pound and 125-pound brass or bronze, angle and globe valves for land use which permit changes and substitutions in the 2-inch size. One specification is E-WW-V-76B which is the emergency alternate for federal specification WW-V-76B, and the other is E-WW-V-51, the emergency alternate for federal specification WW-V-51. Copies of the emergency alternate specifications may be secured from the Federal Catalog Division, room 572, Procurement Division building, Washington, by any person who may be interested.

KEEP WAR PRODUCTION
ROLLING!
Move More Material
FASTER
WITH
STANDARD CONVEYORS
Planned and installed to meet handling needs in your plant, Standard power driven or gravity operated conveyors assure smooth, uninterrupted service 24 hours daily, a full seven days per week—keep materials and parts flowing—fast and sure—from machine to machine—department to department—help maintain the swift tempo of wartime production.
Booklet Shows What
STANDARD CONVEYORS Can Do
Fully illustrated—the booklet, "Conveyors by Standard," is a "mine of information" on conveying methods with power and gravity conveyors—contains 76 pages of data—representative installations in all types of industries—a useful reference book for production executives. Write for your copy of Bulletin F-6—"Conveyors by Standard."
STANDARD CONVEYOR CO.
General Offices: North St. Paul, Minn.
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"THE STANDARD OF VALUE"
Standard CONVEYORS
FIRST FOR FASTER PRODUCTION

Obituary

WALTER B. Rowbottom, 41, secretary, Diversey Foundry Co., Geneva, Ill., died at his home in Chicago, recently. He was a member of the American Foundrymen's Association.

* * *

Ole Arndt Arneson, 74, founder, Arneson Foundry Inc., Kenosha, Wis., died April 19 in Kenosha.

* * *

Harold N. Scott, 57, president and general manager, Fish Oven & Equipment Co., Beloit, Wis., died April 2 in Beloit. Mr. Scott formerly had been associated with Griffin Wheel Co., Chicago.

* * *

C. H. MacDonough, 50, for the past 2 years salesman for the Motor Castings Co., Milwaukee, died May 2 in Milwaukee.

* * *

Burdette Tomlin, 65, president, Silica Sand Co., Millville, N. J., died May 4 at his home in Ocean City, N. J.

* * *

William H. Taylor, 96, who retired in 1899 after more than 30 years with the West Point Foundry Co., died May 4 at his home in Cold Spring, N. Y.

* * *

George W. Gwinn, 68, director, American Machine & Foundry Co., Brooklyn, N. Y., died April 22. Mr. Gwinn had been with the company for 50 years.

WPA Helps Collect Farm Scrap

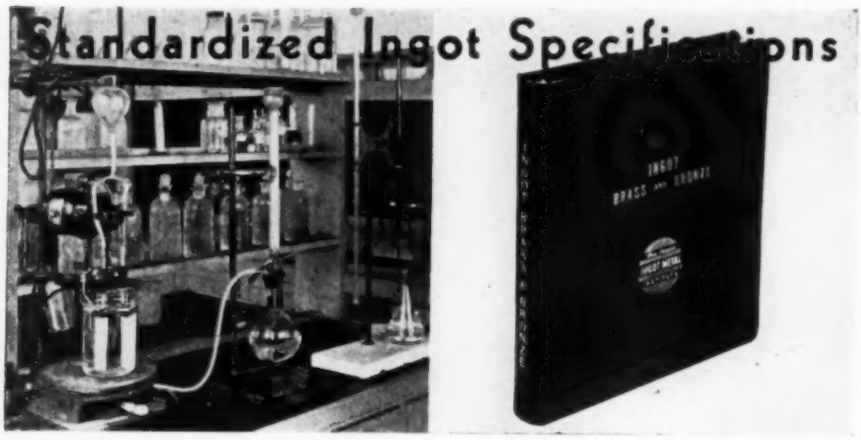
Aid of the Work Projects Administration has been enlisted in collecting from the nation's farms accumulated scrap metals and rubber urgently needed to keep war production at top capacity.

Provision for the use of labor and trucks furnished by the WPA in gathering the scrap from the rural areas was made in a nationwide project sponsored by the Bureau of Industrial Conservation of the War Production Board. The WPA collection supplements the "Salvage for Victory" program in operation under the direction of the bureau through state salvage committees set up in 42 states, in co-operation with the state and county war boards of the Department of Agriculture. Efforts are devoted to areas where the scrap is not moving in sufficient quantities.

A.S.T.M. To Meet in Atlantic City

More than 100 technical papers and reports will be presented at the forty-fifth annual meeting of the American Society for Testing Materials which will be held at Chalfonte-Haddon Hall, Atlantic City, N. J. from June 22 to 26. During that time more than 150 meetings of technical committees also will be staged. One of the outstanding technical features of the meeting will be a symposium on radiography which will cover such phases as low voltage x-rays, inspection of aircraft parts, examination of welds and weldments, examination of steel castings, million volt x-ray equipment, protection of workers, etc.

Subjects which will be discussed in technical papers in the field of ferrous and nonferrous metals include: Fatigue tests as a means of evaluating corrosion damage, influence of combination of principal stresses on fatigue of metals, creep strength of malleable iron, correlation of mechanical properties with radiographic appearance of magnesium alloys, creep characteristics of some copper alloys at elevated temperatures, comparative quality of converter cast steels, and a new magnetic test method.



CONSERVE TIN BY USING TOMBASIL . . .

an Established Silicon Bronze for Castings!

Use Ajax
"NAVY" TOMBASIL

15 STANDARD ALLOYS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin

NOTE

The first program for scientific control of ingot metal production was set up in and by the Ajax Metal Company 44 years ago.

A copper-silicon-zinc alloy of the useful and versatile 'Tombasil' family has been developed expressly for the war trend in nonferrous castings. Its use releases relatively large quantities of tin used in bronze alloys formerly required for such castings.

According to exhaustive laboratory and field reports, this new alloy, known as Ajax *Navy Tombasil*, possesses physical properties far in excess of either Govt. "G" Bronze (88-10-2 and 88-8-4), Spec. 46M6G; or "M" metal, Spec. 46B8G; as well as the Cu. Si. Alloy known as Spec. 46B28.

Your inquiries will receive prompt attention.

THE AJAX METAL COMPANY
ESTABLISHED 1880 PHILADELPHIA

ASSOCIATE COMPANIES: AJAX ELECTRIC FURNACE CORPORATION, *Ajax-Wyatt Induction Furnaces for Melting*
AJAX ELECTROTHERMIC CORPORATION, *Ajax-Northrup Induction Furnaces for Melting, Heating*
AJAX ELECTRIC COMPANY, INC., *Electric Salt Bath Furnaces*

Apprentice Winners In A.F.A. Contest

In the patternmaking contest, staged in the Cleveland Auditorium during the recent A.F.A. convention April 20-24, the winners were announced as follows: 1st place, Cassimer Skrocki, Falk Corp., Milwaukee; 2nd, Walter Zernechal, Hill-Acme Co., Cleveland; 3rd, Richard Kiloh, Miehle Printing Press Mfg. Co., Chicago.

In the nonferrous division the awards were given to Ferd Sevenz, Ampco Metal Co., Milwaukee, 1st; Dan Mrotek, Wisconsin Aluminum Foundry Co., Manitowoc, Wis., 2nd; and third place to John Jasso, Wellman Bronze & Aluminum Co., Cleveland, in the bronze division.

Apprentice winners in the gray iron castings division: 1st, Neal B. Hamilton, Caterpillar Tractor Co., Peoria, Ill.; 2nd, Edward Drebus, Universal Foundry Co., Oskosh, Wis.; 3rd, James Nowickar, Sheboygan Foundry Co., Sheboygan, Wis.

Winners in the steel casting division were listed as: 1st, Robert Bina, Crucible Steel Castings Co., Cleveland; 2nd, Richard Bareh, Crucible Steel Casting Co., Cleveland; 3rd, Arthur Tazalla, Wisconsin Chapter A.F.A., Milwaukee.

Patterns and castings in all cases showed excellent workmanship on the part of the competitors and involved painstaking work on the part of the judges to differentiate in the majority of instances of only a few points between the various exhibits.

Judges in the patternmaking division included: G. Gedeon, Aluminum Co. of America; Walter Seebeck, Western Pattern Works; C. Hamburger, Elementary and Junior High Schools, Cleveland Board of Education; Pat Dwyer, THE FOUNDRY; E. Guttman, Standard Pattern Works; R. Tisdale, Service Pattern Works; F. Leuthjohn, Forest City Foundries Co.; A. Anderle, Motor Patterns Co.; W. Sedlon, Master Pattern Co.; J. Zernechel, Hill Acme Co.; Frank Hrabak, East End Pattern Works.

In the nonferrous castings division awards were made by F. S. Wellman, Wellman Bronze & Aluminum Co.; Clifford Woodfill, Westinghouse Electric & Mfg. Co., Pat Dwyer, THE FOUNDRY.

Gray Iron castings entries were judged by W. C. Manwell, Fulton Foundry & Machine Co.; William Thomas, Kilby Mfg. Co.; Martin Solberg, City Foundry Co.

Judges in the steel castings division included Ralph H. West, West Steel Casting Co.; Fred Stewart, National Malleable & Steel Castings Co.; Pat Dwyer, THE FOUNDRY.

"I AM HEAT-FAG. I attack workers who sweat — who lose body salt and then don't replace it. Through fatigue and inalertness, I make them 'drop their guard' — I not only spawn . . . I cause accidents."

Heat-Fag is the all-out, unseen enemy of production. Thousands, yes, millions of precious man-hours can be lost through this insidious force that saps men's strength—lowers their efficiency —wears them down before the shift is over. Salt sweated from the body must be replaced — or Heat-Fag takes its toll.

AVOID HEAT-FAG··USE
MORTON'S
SALT TABLETS

QUICK DISSOLVING
(less than 30 seconds)
This is how a Morton Salt Tablet looks when magnified. Examine one—see how soft and porous it is inside. When swallowed whole — with a drink of water, they dissolve in less than 30 seconds.

Wherever workers sweat, Salt Tablets are needed, for they represent the simple, easy way to replace salt that's lost through sweating and hot work.

Case of 9000 10-grain salt tablets, ... $2.60

Salt-Dextrose Tablets, case of 9000 . . . . . $3.15

Order from your distributor—or directly from this advertisement.

Place MORTON'S DISPENSERS at all Drinking Fountains
They deliver salt tablets, one at a time, quickly, cleanly — without waste. Sanitary, easily filled, durable. 500-tablet size, $3.25. 1000-tablet size $4.00

MORTON SALT CO., Chicago, Ill.

FREE Sample Tube
Write—on your firm letterhead — for a pocket size sample tube of Morton's Salt Tablets and for the new folder — "Heat-Fag and Accidents Ride Together."

EVERYONE WHO SWEATS NEEDS SALT

Nonferrous Prices Set by OPA

Maximum prices for nonferrous foundry products based on levels prevailing between Oct. 1 and 15, 1941, were announced May 11 by Price Administrator Leon Henderson. Foundries accounting for more than 70 per cent of the nation's output of nonferrous castings stated last January, in compliance with a request of the Office of Price Administration, that they would maintain prices based on those of the first half of last October. While there has been no indication that the remaining 30 per cent of the foundry industry has not been complying with the OPA request, maximum prices were formally established "to insure that the whole industry complies," according to the announcement.

The new price measure—Maximum Price Regulation No. 125—became effective May 11. Hereafter, regardless of any contract, no company shall sell or deliver nonferrous castings substantially the same as those sold between Oct. 1 and 15, 1941, at prices above the highest prices charged between Oct. 1 and 15, 1941, or castings substantially different at prices higher than would have been charged Oct. 15.

OPA has stated that the price levels which were maintained voluntarily since last January are generally fair and equitable to the nonferrous foundry industry.

"Data on sales and profits have been received from foundries with total sales in 1941 of $166,000,000 which may be considered a substantial part of the total sales made during 1941 by all nonferrous foundries," OPA declared. "The data received indicate that net profits after taxes of these firms were greater than in any of the previous 5 years. Only five companies reported losses on 1941 operations.

"Reported total dollar profits for 1940 were 2.7 times the reported average total dollar profits earned in the period from 1936 to 1939 inclusive. Reported dollar profits in 1941 were 7.3 times the reported average total dollar profits earned during 1936-39 and 2.7 times the profits earned during 1940, in spite of the fact that reported sales for 1941 increased only 88 per cent over reported sales for 1940. Sales of those foundries which reported sales for September 1941 and January 1942 increased 14.7 per cent in January over September.

"In view of the appreciable profit increase in 1941, and in view of the numerous indications of a significant increase in sales during 1942, profits of the nonferrous foundry industry during 1942 should prove more than satisfactory on the basis of the prices prevailing during the period from Oct. 1 to Oct. 15, 1941."

Book Review

True Steel, by Christy Borth, 306 pages 6 x 9 inches, cloth, published by Bobbs-Merrill Co., Indianapolis. Price $3.00.

This is a biography of George M. Verity, founder of the American Rolling Mill Co., Middletown, O., and a record of the men who helped him organize that concern. Because Mr. Verity's life span coincides with the growth of the steel industry, the book also is a record of that industry's development. One of the many interesting chapters tells of the experiments at the mill to deoxidize steel. The success of the experiment proved to be the basis for increasing the number of applications for the company's product. Another of the concern's achievements through experiment was the perfection of the continuous, wide strip rolling mill, a process which has been licensed to the entire industry.

DO THE JOB WITH PRODUCTION MACHINES

That have been designed for and proven by many years of service.

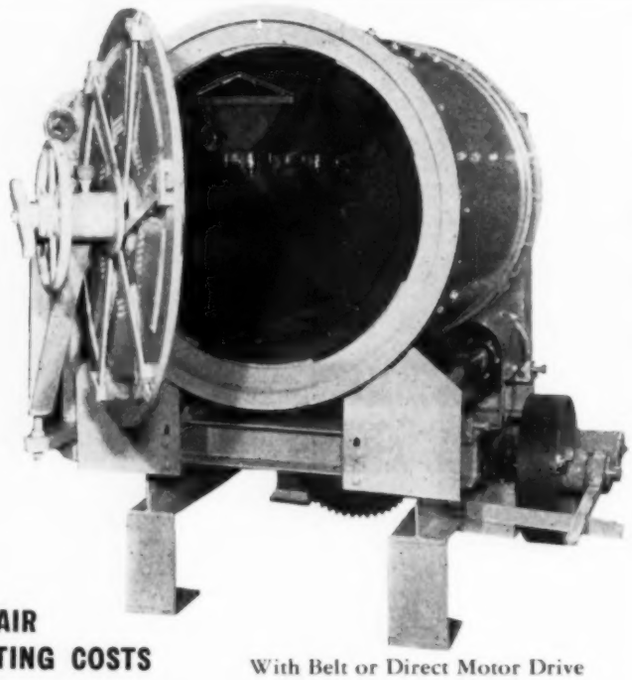
CONTROLLED AIR BLAST with Sand — Grit or Shot for cleaning castings, stampings, heat treated articles and springs. Complete unit—Abrasive automatically returned to nozzles, all within the barrel. Cleaning time—10 to 20 minutes. Charge—Up to 1000 lbs.

Shipping for War Production

NOTE: NEW DESIGN

FASTER CLEANING

LOWER REPAIR AND OPERATING COSTS



With Belt or Direct Motor Drive

95% WELDED STEEL CONSTRUCTION—WITH NEW FEATURE FOR REMOVING ALL THE DUST FROM ABRASIVE AND BARREL. WRITE FOR BULLETIN "SW".

DREISBACH ENGINEERING CORP.

527 Fifth Ave., New York, N. Y. 45 Warburton Ave., Yonkers, N. Y.

foundry activities

AMERICAN Magnesium Corp., has taken over space in the Apex Electric Mfg. Co. warehouse, 1099 Ivanhoe road, Cleveland. Small additions and remodeling are underway. Production of magnesium castings is to start by June 15.

* * *

Cayuga Foundry Co., Inc., Port Byron, N. Y., has been incorporated.

* * *

Castaloy Corp., Los Angeles, has been incorporated with a capital of $50,000.

* * *

Cooper-Bessemer Corp., Grove City, Pa., is building a pattern storage building which will double the plant's pattern storing facilities.

* * *

Allied Steel Castings Co., 147th street and Lincoln highway, Chicago, will begin work on a foundry addition.

* * *

Wehr Steel Co., Milwaukee, has been granted a permit for an addition to its foundry on West Mobile street.

* * *

Carnegie-Illinois Steel Corp., Chicago, has awarded contract to Berquist Construction Co., for erection of a foundry.

* * *

Bass Foundry & Machine Division, National Industries Inc., Fort Wayne, Ind., plans a one-story addition. T. W. Sammons is manager.

* * *

United Engineering & Foundry Co., Pittsburgh, will construct a large foundry and machine shop at New Castle, Pa.

* * *

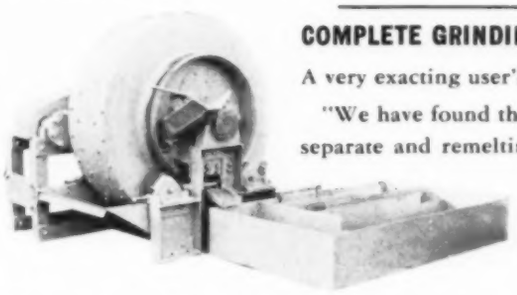
Illinois Institute of Technology, Chicago, has appropriated $100,000 for an addition to the Armour Research Foundation's new metallurgy building. The building will be three stories high and will provide 500,000 cubic feet of space for metallurgical research. The 3-story height is necessitated by head-room requirements of such equipment as the 3000-pound per hour cupola and die casting apparatus. Other equipment includes two induction furnaces, core ovens, a small rolling mill, and wire drawing machinery. Construction of the building, started in 1940, is expected to be completed late this year. The addition is expected to be the final unit of the structure, and total cost of the building is estimated at $250,000. Research work already has begun in the first unit of the building erected to house an experimental foundry.

* * *

Contract for construction of a $500,000 addition to the plant of the United Engineering & Foundry Co.,

RECLAIM 99½% CLEAN-REMELTING METAL

From All Non-Ferrous Skimmings



Above — Rate of Feed — 800 to 1200 pounds per hour. No. 4 size Mill — complete with settling tank. Also No. 5 size—not shown.

COMPLETE GRINDING AND CONCENTRATING UNIT

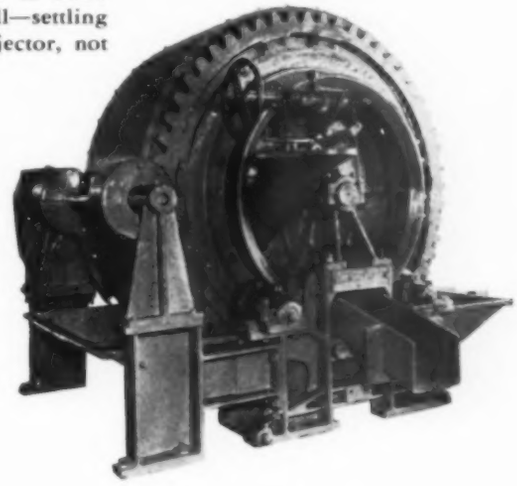
A very exacting user's statement:

"We have found that by keeping these types of dross separate and remelting the metallic content after processing in your mill, that a suitable ingot can be procured which can be melted directly back into specification production".

INSTALLATION COST RETURNED IN 3 TO 12 MONTHS

At right — Rate of Feed — 3000 to 6000 pounds per hour. No. 6 size Mill—settling tanks with automatic Sludge Ejector, not shown.

WAR DEMANDS PRODUCTION WITH EVERY POUND OF METAL



TOTAL RECLAIMING COSTS FROM 1/10 TO 1/4 CENT PER POUND. MOST EFFECTIVE AND LOWEST MILLING COSTS WITH MANGANESE STEEL CRUSHING ROLLS, WITH FLEXIBLE MOUNTING TO PASS MILL FEED SIZE PIECES. WRITE FOR BULLETIN "M".

DREISBACH ENGINEERING CORP.

527 Fifth Ave., New York, N. Y. 45 Warburton Ave., Yonkers, N. Y.

Youngstown, O., has been awarded. Two new buildings one 200 and the other 300 feet long comprise the addition. Of the $500,000, approximately $300,000 will be used for equipment.

* * *

Index of new equipment orders for March, 1942, according to a report of the Foundry Equipment Manufacturers Association, Cleveland, was 1352.7 as compared with 636.6 in February. Index of repairs was 428.8. The index of 100 represents the monthly average of reported sales to metal working industries during 1937-38-39.

* * *

Sadler Cast Metals, Inc., whose organization was announced in the April issue of THE FOUNDRY, is located at Old Nepperhan avenue, Yonkers, N. Y. This company produces iron, brass, bronze, aluminum and magnesium castings. R. Watson Sadler is president.

* * *

Rogers Bronze & Magnesium Foundry, Los Angeles, has been incorporated with a capital of $150,000. Directors are: Ralph G. Ritchie, Lena B. Rogers and Albert E. Rogers. The company formerly was known as the Rogers Pattern & Foundry Co., producer of brass, bronze and aluminum castings.

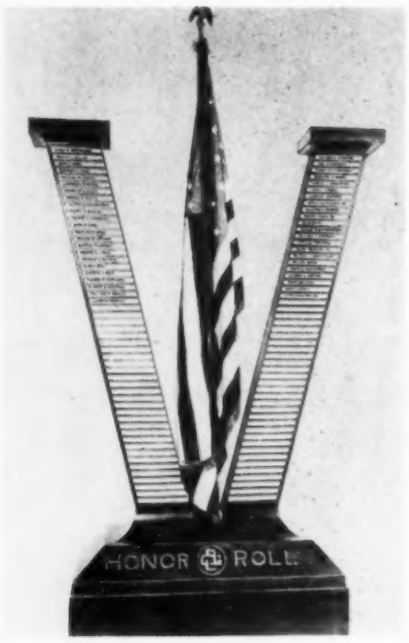
* * *

Wesley Steel Treating Co., Milwaukee, has purchased the old Grimm foundry at Manitowoc, Wis., and plans to establish a branch plant there. The building is to be remodeled and will house a business to be known as the Wesley Heat Treating Co. Charles I. Wesley is president.

There is no better proof
of a Product's Performance than the REPEAT ORDERS it Earns!
A Few of the Firms That Have Re-Ordered Maehler Ovens and Furnaces
Bohn Aluminum Co.
Norris Stamping & Mfg. Co.
Eastman Kodak Co.
American Brake Shoe & Foundry Co.
Bausch & Lomb Optical Co.
Brown & Sharpe Mfg. Co.
Midland Steel Products Co.
W. A. Jones Foundry & Machine Co.
Curtiss Propellor Division, Curtiss-Wright
Ternstedt Mfg. Div., General Motors
Corhart Refractories Co.
Advance Aluminum Castings Corp.
Clayton Mark & Co.
Patch Wegner Co., Inc.
Chambers-Bering-Quinlan Co.
Wm. D. Gibson Co.
AND THERE ARE MANY MORE — THE LIST IS A LONG ONE!
• The bulk of all Maehler Ovens and Furnaces being built today must go to fill a long list of repeat orders from customers engaged in War's forced draft production. There is no more conclusive evidence of the superior performance of Maehler equipment than this re-order endorsement from among the leaders of industry, and there is no better guide to your future purchases of this type of equipment.
THE PAUL MAEHLER CO.
2200 W. Lake St., Chicago
MAEHLER
OVENS and FURNACES for Heat Treating — Core Baking — Japanning, etc.

Honor Roll

Gardner-Denver rock drill manufacturing plant in Denver, Colo., has designed an honor roll for employes who have entered the armed



services of their country. As additional employes enter the service, their names are entered on cards that are slipped into place on the *V*. The flag and *V* are floodlighted.

Book Review

TechniData Handbook, by Edward Lupton Page, 64 pages, 5½ x 8½ inches, published by Norman W. Henley Publishing Co., 17-19 West Forty-fifth street, New York. Spiral binding, $1.00.

The handbook was prepared by the author when a student as a ready source of data on engineering, chemistry, physics, mechanics, and mathematics. Formulae with short explanations of terms have the units and common constants given. The material included is of value to engineers, designers, mechanics, chemists and technical students.

Governs Aluminum For Patterns

By M. E. Kohler
Scientific Cast Products Corp.
Cleveland

War Production Board has asked industry to conserve aluminum by careful planning. So that all foundries and pattern shops may be familiar with aluminum orders of the WPB governing scrap and secondary aluminum for pattern equipment, the following is taken from orders pertaining to the industry.

Aluminum Order M-1-d, Aluminum Scrap, Paragraph F, All other scrap. No person who owns or originates any scrap (other than a person generating plant scrap or a dealer) may sell or deliver such scrap except to a producer, approved smelter or dealer; he shall not use or dispose of such scrap in any other way.

Aluminum Order M-1-e, Uses of Aluminum; Paragraph 6 Matchplates, Patterns and Snap Flasks; provided, that the customer certifies in writing to the manufacturer

that they will be used as an aid to manufacture where light weight and strength are essential in production in the fulfillment of orders bearing priority ratings higher than A-2. Only low-grade aluminum, which has not been debased, shall be used for this purpose.

Paragraph 9 Repair and Maintenance Parts for mechanical or electrical equipment used domestically or in industry; provided, that the manufacturer certifies in writing to the WPB, Ref. M-1-e, that parts made of other material cannot be used and that an equivalent weight of similar defective aluminum parts has been returned by the ultimate consumer and disposed of as provided in Supplementary Order M-1-d. Only low-grade aluminum which has not been debased shall be used for this purpose.

Memo Dated March 18, 1942. The WPB will interpret Section 9 under Paragraph (b), to allow the use of obsolete pattern equipment in the making of new pattern equipment to be used in the fulfillment of high production orders carrying A-10 or higher priority ratings, and provided low-grade aluminum which has not been debased is used.

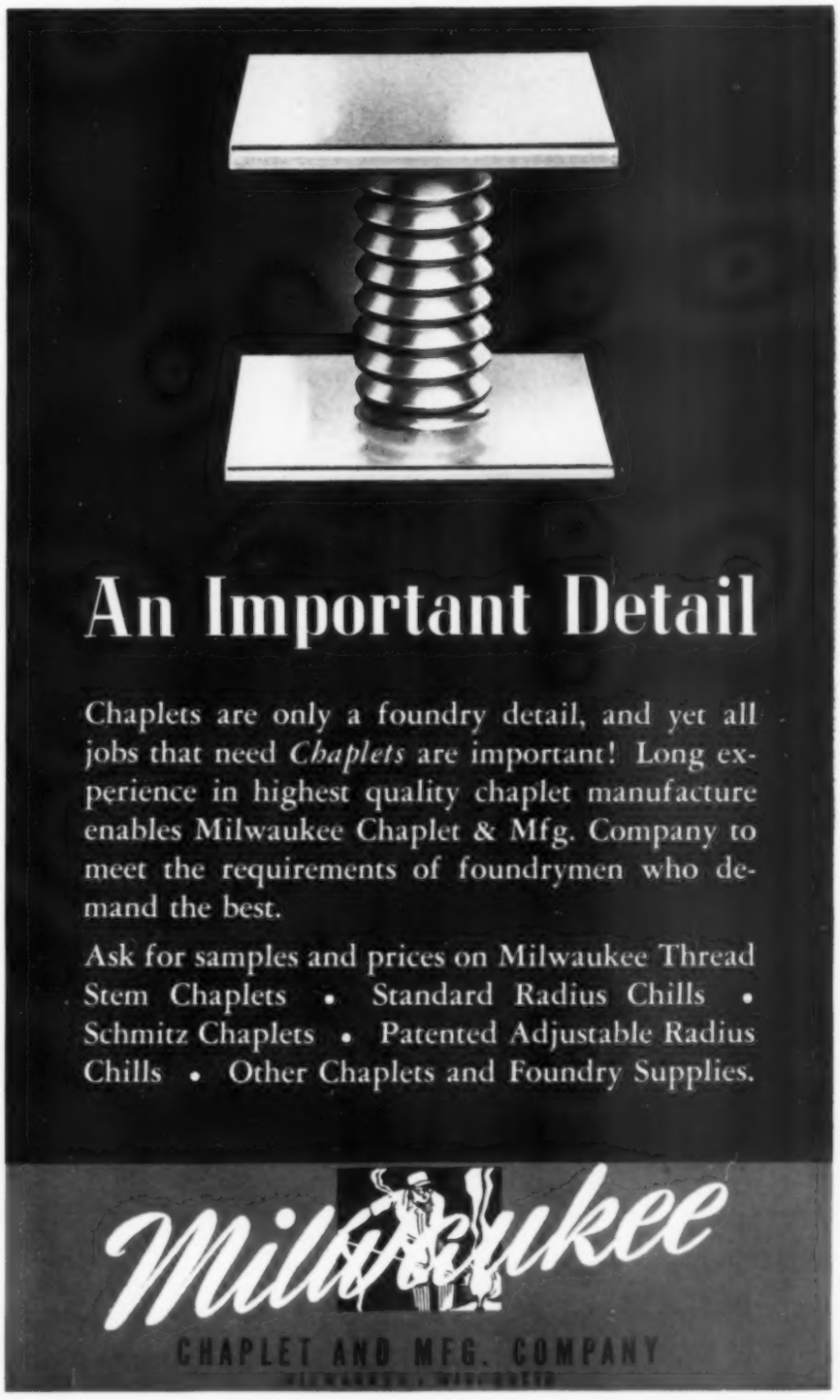
Provision: Manufacturers of pattern equipment may fill orders bearing A-10 or higher preference ratings, *provided,* that the customer certifies in writing that aluminum is required because of light weight and strength, and supplies the manufacturer with *an equal weight of similar defective or obsolete aluminum pattern equipment in exchange.* The obsolete aluminum supplied to the manufacturer must not have been reported on the customer's Form PD-40A as dead stock.

These orders make it possible for producers to supply aluminum for matchplates for production castings covered by ratings higher than A-2. On these orders it is not necessary to secure an extension but the customer's order should carry the following certification and information.

"This is to certify that production pattern equipment ordered herein is required to be lightweight to produce castings of .....
(a) ..... for ..... (b) .....
rated ..... Contract No. .....
Certificate No. .....
(a) Name of part.
(b) Army, Navy, or Aircraft.

Note: If made under "Industry Rating", insert "P" rating number and serial number in place of contract and certificate numbers.

On orders rated A-2 to A-10 the same certifications and information


An Important Detail
Chaplets are only a foundry detail, and yet all jobs that need *Chaplets* are important! Long experience in highest quality chaplet manufacture enables Milwaukee Chaplet & Mfg. Company to meet the requirements of foundrymen who demand the best.
Ask for samples and prices on Milwaukee Thread Stem Chaplets • Standard Radius Chills • Schmitz Chaplets • Patented Adjustable Radius Chills • Other Chaplets and Foundry Supplies.
Milwaukee
CHAPLET AND MFG. COMPANY

is required and it also is necessary that customers supply the pattern manufacturer with an equal weight of defective or obsolete pattern equipment.

If there exists a real reason for production pattern equipment and no rating has been accorded the parts to be made, it has been announced that special consideration will be given by the WPB upon application filed by appeal answering in detail the 11 questions under paragraph (e) of Form M-1-e. Mail appeal to Aluminum and Magnesium Allocation Department, War Production Board, Temporary Building R, Washington.

Salvaging Borings And Turnings

Robinson D. Bullard, reclamation engineer, Bullard Co., Bridgeport, Conn., reported on the firm's reclamation program at the A.S.M.E. conference on industrial salvage which was held in New York recently. The company's briquetting plant is handling 15,000,000 pounds of iron borings and steel turnings for remelting, is saving 25,000 gallons of cutting and lubricating oils a year, and 125,000 pounds of cotton and wool waste.

Through careful handling and systematic routing of borings and turnings, the company recovers some 35,000 pounds of chromium and 75,000 pounds of nickel a year which materially reduces its demand for virgin metals used in producing machine tool. Mr. Bullard stated that reclamation by the company also extends to cutting tools. Tools that become worn are first reconditioned for use in the plant, and if reconditioning is not possible, the tools are catalogued for the benefit of other manufacturers whose work may not call for the fine tolerances needed to produce machine tools.

R. D. Bullard

KEEPING FIT BOOSTS PRODUCTION

Sanitary Showers Put Fight Into Jobs

As every production man knows, more production is possible when men put fight into their jobs. Keeping fit is a sure way to boost production and keep down man-hours lost through sickness.

Many plants have installed Bradley Multi-Stall Showers to keep their men fit and their morale up. Probably you can benefit likewise and get out that extra increment of production to get this war job done quickly.

Easy Installation in New or Existing Buildings

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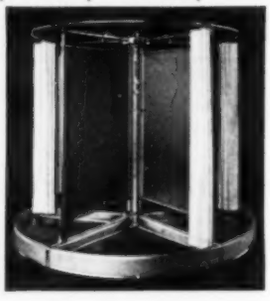

BRADLEY multi-stall showers

Develop Emergency A.S.T.M. Specs

Since the procedure for preparing emergency provisions and complete emergency specifications or tests was established late in 1941 by the American Society for Testing Materials, a number of such actions have been developed by the technical committees of that society. All changes and new specifications have the one aim, expediting procurement and conserving critical or strategic materials during the emergency.

To make emergency actions effective quickly, the A. S. T. M. procedure provides for approval in an appropriate subcommittee, endorsement of the chairman of the main standing committee and then approval by the society's committee E-10 on standards, a reviewing committee consisting of six outstanding authorities, long-time A. S. T. M. members, who must decide whether the group has reached a substantial consensus.

In Committee A-1 on Steel im-

portant changes were approved in six specifications covering steel castings, four of these covering material for service at normal temperatures and two for service at elevated temperatures. These specifications are as follows: Carbon Steel Castings for Miscellaneous Industrial Uses (A 27-39); Carbon Steel and Alloy-Steel Castings for Railroads (A 87-36); Alloy-Steel Castings for Structural Purposes (A 148-36); Carbon-Steel Castings Suitable for Fusion Welding for Miscellaneous Industrial Uses (A 215-41); Carbon Steel Castings Suitable for Fusion Welding for Service at Temperatures up to 850 Fahr. (A 216-41 T); Alloy-Steel Castings Suitable for Fusion Welding for Service at Temperatures from 750 to 1100 Fahr. (A 217-41 T).

In the first four items, a number of provisions will bring chemical and physical properties in line with other specifications, particularly Federal Specifications QQ-S-681b and proposed Navy requirements, but other modifications are also set up, one permitting removal of the castings from the furnace charge during the heat treatment at 750 Fahr. instead of 500 Fahr. The manganese requirements can be waived in specifications A 27 so that the material could come from a low alloy heat instead of making a special higher carbon steel. In the railroad specifications reduction in the number of test coupons will expedite production and a new emergency Grade 4 in the structural alloy-steel castings is similar to a current widely used grade. This has minimum tensile strength of 105,000 pounds per square inch, 85,000 pounds per square inch yield point, and 13 per cent elongation in 2 inches. A reduction in the number of grades of weldable carbon steel is effected in the specifications A 215 so that castings in the five new modified grades can also be used for federal and Navy requirements.

The emergency changes in the requirements for weldable castings for service at high temperatures, A 215 and A 216, will cover a use of material for pressure containing turbine castings which have been specified in accordance with these two standards, but which have really not been applicable until the emergency changes now cover this use.

Magnus Chemical Co., Garwood, N. J., recently organized a machine division for the manufacture of mechanical and metal washing machines, pickling machines, driers, ovens and burnishing equipment. The division will be under the direction of Marcel Zinty, formerly general manager of the Magnus European factory.

Book Review

Industrial Supervision, by Vernon G. Schaefer and Willis Wissler, 5½ x 7½ inches, cloth, published by the McGraw Hill Book Co., 330 West Forty-second street, New York, two volumes, $1.75 each.

These books are a part of Pennsylvania State College's industrial series prepared under the direction of the Division of Engineering Extension of the college.

The first volume deals with organization of industrial supervision. The chapter headings trace the discussion: Industrial development; the foreman's job; the foreman as manager; harmonious relations in industry; analysis of workers jobs; job evaluation; selection and placement; training; merit rating; production planning. The book contains a bibliography for additional study on the subject.

The second volume covers controls in industrial supervision and deals with such subjects as: Human nature; interesting the worker; building morale; reducing turnover, promoting safety, dealing with grievances; waste control; labor rela-

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tions; industrial economy; leadership. This book also has a bibliography listing books for further study.

Conserves Tin in Bronze Castings

Emergency alternate federal specification E-QQ-B-691A for bronze castings recently issued in the interest of conserving strategic metals has been approved by the director of procurement for suitable alternate materials covered in federal specification QQ-B-691A. Alternate materials other than tin bronzes include QQ-B-601, brass castings to be brazed; QQ-C-593, copper-silicon alloy castings; QQ-B-621, brass commercial and naval castings; QQ-I-652, gray iron castings; QQ-I-666, malleable iron castings, and QQ-S-681, steel castings.

When compositions 2, 3 or 5 bronze castings are specified the requirements and provisions of QQ-B-691A shall apply except for the following chemical and physical requirements: No. 2—78.0 to 82.0 per cent copper, 2.5 to 3.25 per cent tin, 7.0 to 10.0 per cent zinc, 6.0 to 8.0 per cent lead, 0.40 per cent maximum iron, 0 to 1.00 per cent nickel, 0.05 per cent maximum phosphorus, 28,000 pounds per square inch tensile, minimum, and 15 per cent elongation minimum. No. 3—same as No. 2. No. 5—85.0 to 89.0 per cent copper, 7.5 to 11.0 per cent tin, 1.5 to 4.5 per cent zinc, 0 to 1.00 per cent lead, 0.25 per cent iron maximum, 0 to 1.00 per cent nickel, 0.50 per cent phosphorus maximum, 35,000 pounds per square inch tensile minimum, and 18 per cent elongation minimum.

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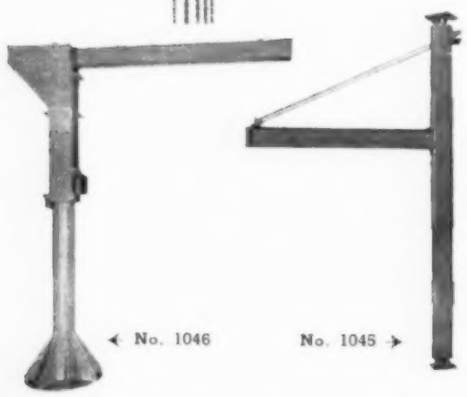

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Book Review

Foremanship Fundamentals, A. L. Kress, 276 pages, 5¾ x 8 inches, cloth, published by McGraw-Hill Book Co., 330 West Forty-second street, New York, $2.50.

The discussion is divided into two parts. The first deals with the foreman and his personnel problems and the second with the foreman and his production problems. The section devoted to personnel problems discusses what men respond to—basic motives or instincts; leadership; the right man for the right job; training; safety and accident prevention; wages and rates; grievances; collective bargaining.

The second section covers such subjects as: Factory organization; getting the most out of your day; planning production schedules; control of cost; keeping costs down; improving methods. An appendix contains case studies in training sheet metal workers, power sewing machine operators, press brake operators and automatic screw machine operators.

Foundry Celebrates Half Century

March 25, 1942, the Twenty-Five-Year Club celebrated the fiftieth anniversary of the founding of the Belle City Malleable Iron Co., Racine, Wis., by a dinner and the publication of a 6 x 9½-inch brochure. Attractively enclosed in appropriate gold-colored covers, the publication showed pictures of the original plant in 1892 and the present extensive plant as it appears today, also pictures of Judson F. Stone, chairman of the board; C. S. Anderson, president and secretary; Judson S. Stone, vice president and assistant secretary; and Stanley Kitto, treasurer. A two-page spread in the center of the publication presented pictures of 44 members of the 25-year club, ranging from Frank Hady with 50 years service to six comparatively young members with 25 years record of service with the company.

ECONOMICAL ALLOYING OF GRAY IRON

(*Continued from page* 55)

In spite of these difficulties, the foundryman can make tremendous strides in the right direction. He can adjust his base iron to suit the greatest number of castings to make certain that in those castings at least, the alloying material will be used most economically. It may be possible by rearrangement of the foundry layout to separate production into two or three distinct groups and make a different base iron for each group. Although it obviously is impossible to make a different base iron for each pattern, we can approach this ideal more closely than we have in the past. Every step made in this direction will pay dividends in conserving vital material.

When the foundryman has control over the base iron analysis he may be able to effect substantial savings merely by varying the carbon and silicon balance.

Keep Silicon Content Low

In recent years there has been a definite tendency toward low carbon-high silicon irons for density and tensile strength. Foundrymen now realize that while low carbon cast irons do have advantages in certain applications, they are not universally essential, nor always superior. Low carbon irons are usually essential for tensile strengths of over 50,000 pounds per square inch and they do have the advantage of being less sensitive to variations in silicon content from the standpoint of chill and machinability. However, they are unusually susceptible to modification, dendritic graphite, or eutecti-form graphite structure which may offset entirely the beneficial effect of low carbon itself. They also are very difficult to cast in intricate sections without excessive shrinkage, and they have reduced resistance to vibration and heat shock. At the present time, low carbon irons have the added disadvantage of requiring large quantities of steel scrap and silicon for their manufacture. Both of these commodities should be conserved wherever possible. Therefore, although low carbon irons do have a very definite place in the industry, many foundrymen have found that they can meet their requirements as well, and in some cases even better, by making higher carbon irons and adjusting the silicon content to control structure. Cast iron of 3.40 total carbon can be used satisfactorily even in castings including heavy sections by keeping the silicon content low. Tensile strengths of 40,000 pounds per square inch are readily obtainable in such base irons by proper adjustment of the carbon-silicon balance and good ladle treatment practice.

Unfortunately, the low silicon irons are rather susceptible to variations in cooling rate. For this reason, it has been common practice for years to use a somewhat higher silicon than is required in theory, in order to guard against chilled corners and edges, and to lower the carbon to obtain the required density and strength. This practice necessarily wastes silicon and reduces the physical properties which are obtainable from any given carbon content. It also contributes to porosity and openness which cannot be tolerated in castings for pressure or wear resistance or high strength.

The difficulty encountered in low silicon irons may be eliminated by two other methods. Unfortunately the most obvious of these is the most difficult. This is to establish closer control of those variables which cause the high chill. Close control over both the cupola and the molding practice is required; this necessitates much supervision and equipment. The function of cupola con-

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trol is to eliminate variations in chemical analyses so as to guard against undue chill.

However, the cupola is not the only source of chill in castings. Wet sand, improper gating, incorrect pouring temperature and many other foundry factors contribute much to chilled edges and hard spots. Accurate control of these factors will also be of vital assistance in eliminating the necessity for excessive silicon.

Unfortunately, there are many factors affecting the chilling characteristics of cast iron which cannot be controlled with our present equipment. These variables can be controlled only by some suitable ladle treatment.

Effects of sulphur, manganese and phosphorus also may affect alloying economy adversely if not maintained within proper limits. Sulphur should be held below 0.12 per cent (except for special applications) and the manganese controlled between 0.60 to 0.90 per cent to minimize chill and thereby reduce the amount of alloying treatment required for chill regulation. If sulphur contents from 0.04 to 0.06 per cent can be obtained uniformly, the manganese may be held as low as 0.40 per cent. This is extremely difficult with normal cupola practice however, so 0.12 per cent sulphur is considered the normal maximum.

The most deleterious effect of high phosphorus (over 0.18 per cent) is excessive shrinkage in castings having interlocking and changes of section. This effect may be difficult or even impossible to offset completely with alloying materials. Every effort should be made to maintain phosphorus at a minimum in intricate sections unless a high percentage is required for other reasons. The tendency toward higher phosphorus scrap under present market conditions may readily account for a portion of the "unexplainable" shrinkage being observed by some foundries today.

These statements do not consider the elimination of alloying materials which are added for a specific metallurgical effect such as heat resistance, wear resistance, uniform density and structure, high tensile to brinell hardness ratio or special microstructure. They will, however, minimize the necessity for alloying additions used merely to offset an incorrect carbon-silicon balance or excessive chill due to variations in foundry practice.

Emphasize Good Control

It is not the purpose here to delve into all of the intricacies of good cupola practice, but rather to emphasize the importance of good control to alloying economy. Assuming that a cupola is being operated within normal limits, that is, correct bed height, proper coke ratio, well controlled blast volume and pressure, hot metal, etc., the most desirable single factor for alloying economy is *uniformity*. A large portion of alloy waste in the foundry is in offsetting variations in the base iron. If variations can be eliminated, considerable savings in alloy cost can be made. First, we must have relatively uniform analyses of the iron at the spout. This can be accomplished only by uniformity of raw materials both from the standpoint of type and analyses. Obviously, this is extremely difficult under the present conditions of the scrap market. Therefore, the foundryman must devote greater care to sorting, grading and sizing of his material than ever before in order to offset as much as possible the difficulties of the present raw materials situation. Uniformity of cupola operation itself is at least equally important. Variations in blast volume and pressure can be tremendously important. Some of the manually controlled practices, such as regular and uniform tapping also can have a marked effect. Uniformity of a cupola charge can be lost completely by having the well capacity a fractional multiple of a single charge. Mixing ladles to smooth

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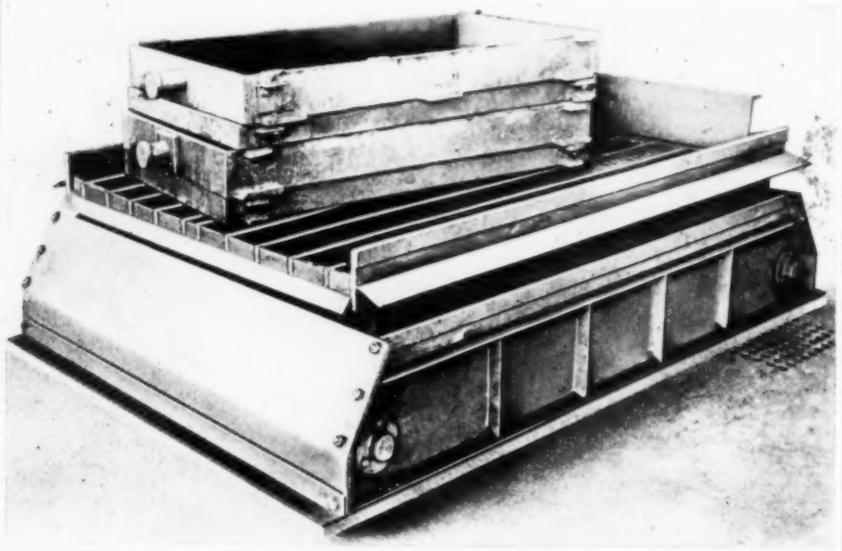

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out normal variations of analyses may prove invaluable when uniformity of raw materials is difficult to obtain.

Equipment for controlling the amount of oxygen passing through the cupola is now well known and generally accepted as a valuable contribution to uniform cupola practice. New equipment is being designed and manufactured which shows considerable promise in the same direction. One such device automatically controls the blast by analysis of gases being discharged from the stack, thereby promoting uniformity of combustion. Another development is the mechanical control of the variation in moisture content of the blast, thereby eliminating a variable which may have tremendous influence on analyses, chill depth and structure. Other new control methods are unquestionably being developed at the present time. These devices help to eliminate the human variable and permit of control impossible by usual manual methods. However, uniformity of materials and practice is still essential or the control by these mechanisms will be wasted. Good cupola practice has always been sound economy in the foundry, but now it becomes even more vital, although more difficult, and therefore requires more time and care than ever before.

Irons Show Variations

Even if perfect control of chemical analyses, raw materials, melting practice and foundry practice were possible, there still would be some uncontrollable variables with which to contend. Variations in chill depth, graphite distribution and structure exist in irons of approximately identical analyses melted under apparently identical conditions. These variations apparently are not controllable by our present methods but they can be reduced by proper ladle additions. The effect of uncontrollable variables is readily discernible by microscopic examination. Cast irons of the same analyses may show either the typical normal graphite flakes or the modified, dendritic, eutectiform, lacy or grain boundary graphite flakes. The modified type graphite may exist in ferrite islands or in a completely pearlitic matrix. The modified structures normally show high chilling tendency, low deflection and poor wear resistance. Either normal or low transverse and tensile strength properties may be found in modified irons depending upon the presence or absence of ferrite islands. Normal and modified structures may be found adjacent to each other in the same piece of cast iron. In fact, this is usually the case. *Very few castings, unless ladle treated, are completely normal or completely modified in all sections.* Physical properties are dependent upon the degree to which modification exists or the percentage of the matrix which exhibits the modified structure.

There are apparently many separate and interrelated causes of the modified structure which have been studied in detail by numerous investigators. Briefly, modified structures are apparently aggravated by: (1) Excessive superheating temperature over and above a given temperature for each type of furnace and charge. (2) Low carbon. (3) High percentages of steel, although this may be merely another manifestation of the low carbon effect. (4) Low pouring temperature. (5) Time at elevated (molten) temperatures. (6) Rapid cooling. Modification also is thought to be affected by wet or green ladles, scale or iron oxide on the ladle lips and by the mold condition. However, it is of practical importance that these undesirable modified structures can be controlled or eliminated by judicious ladle additions of various types. Field experience would indicate that practically all gray cast iron is subject to modification to some degree under some conditions of cooling, but can be controlled by means of some ladle treatment. The use of

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ladle treatments to eliminate undesirable variations in structure is therefore no more an indication of faulty foundry practice than is the use of deoxidizers in the steel mill an indication of faulty furnace practice.

There are a number of theories used to explain the action of ladle addition alloys. Each has its own adherents and advantages, but primarily each theory is valuable in that it permits the metallurgist to picture the mechanics of the action and predict the effect of various types of materials. The correctness of the theory is of no particular concern to the practical foundry engineer as long as that theory fits the facts and gives him a working picture of the effect.

Briefly then the three most widely accepted theories of ladle addition are as follows:

(1) GRAPHITE NUCLEI THEORY. This theory assumes that the ladle addition causes a seeding effect by furnishing submicroscopic nuclei of graphite for the flakes to grow upon. This more or less follows the basic theories of crystallization which indicate that crystal growth takes place by a build up of material around a nucleus of similar or foreign material in the molten mass.

(2) SILICATE SLIME THEORY. This theory is similar to the first except that it assumes submicroscopic film or slime refractory particles which serve as the nuclei for graphite crystallization. This process may be compared to the build up of snow flakes around some particles of dust.

(3) DEGASIFICATION THEORY. This theory is based on the known change in the solubility of gases in molten iron with changing temperature, particularly the marked difference between the solubility of gases in solid iron and liquid iron. The evolution of this dissolved gas upon freezing or the unsuccessful tendency toward such evolution may produce under-cooling of the melt and force the metal to freeze at a lower temperature than usual. Such under-cooling would then inhibit normal graphitization, permitting formation of some modified graphite. Effect of the ladle addition then would be to reduce the amount of dissolved gas or at least aid in the establishment of equilibrium and eliminate super-saturation, and thereby reduce the tendency toward under-cooling or reduce the effect of under-cooling. This process is frequently termed deoxidation following the usual steel practice terminology. There is considerable doubt whether oxygen is the only culprit. Various investigators have indicated that both hydrogen and nitrogen may also be involved. It perhaps should be emphasized that the effect of dissolved gases in molten cast iron is not related to the presence or absence of gas pockets or blow holes in castings, although it apparently is related definitely to porosity and internal shrinkage. Porosity and internal shrinkage normally are reduced by judicious ladle treatment and aggravated by over-treatment or over-reduction.

Exact effect of any given ladle treatment depends on the condition of the base iron and the secondary or composition effect of the material added. In general the ladle treatment effect alone is to increase deflection, wear resistance, tensile and transverse strengths and toughness. It also tends to relieve porosity and eliminate modified microstructure. One of the outstanding effects, and one which may be used as a criterion of effectiveness, is chill reduction not explainable on the basis of change of composition. For example, tests show the use of the proprietory alloy Graphidox No. 4 will permit casting gray iron of 2.50 per cent total carbon; 1.50 per cent silicon; with no evidence of chill in rather light sections. Normally such an iron would be completely white as cast and yet there is nothing in the chemical analysis to explain its being gray. These chill reduction effects of ladle treatments are of ut-

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most importance in many applications. In the first place, they improve machinability by eliminating hard spots and chill corners without necessarily reducing the brinell hardness. Secondly, they permit the use of the lowest possible silicon content without danger of chilled corners and thereby improve the physical properties and density of base irons of any given total carbon.

Ladle Additions Vary

Quantitative effect of ladle additions on the physical and mechanical properties varies with the original structure of the base iron. Obviously, an iron containing a high percentage of modified structure will be improved more markedly by the elimination of such structure than one which is only slightly modified. This brings us to one of the most vital contributions of ladle additions — uniformity. Untreated base irons will tend to contain varying percentages of modified structure and consequent fluctuations in physical properties. Ladle treatment tends to eliminate the fluctuation in properties and chill by reducing or eliminating the tendency to modification. In this way ladle additions increase the average physical properties and reduce the variations in such properties. Both effects improve the utility of cast iron as an engineering material. For example, if an untreated cast iron varies in tensile strength from 33,000 pounds per square inch to 39,000 pounds per square inch, it can be used only as a material of 33,000 pounds per square inch, and any strengthening alloying material added must be added on the basis of this minimum value. If, by ladle addition, one can limit the variation in tensile strength within the range from 37,000 to 39,000 he has increased the effective strength by 4000 pounds and reduced the waste of strengthening alloying materials. Many ladle additions also have an inherent strengthening effect which further improves the quality of the iron and reduces the waste. As a rule, the effectiveness of alloying materials, such as nickel, copper, chromium, molybdenum and vanadium, is markedly improved by ladle additions. This is due to the tendency of ladle treatments to promote pearlitic structures and eliminate modified areas. Therefore, ladle additions are important to good foundry practice and alloying economy.

Although ladle addition materials have the same general effect they differ in composition and type. No single material is universally superior for all applications or foundry practices, although some cover a much wider range than others. The earliest type of ladle treatment was the graphitizing type. This type includes ferrosilicon, calcium silicide, silico-manganese, graphite and the proprietory alloys such as Alsifer and Graphidox No. 4. The first of these to receive wide publicity was calcium silicide, but probably the first one used was ferrosilicon. The first materials used, of course, were those already available for other purposes and which also were found to be more or less effective as end treatments. The development of special alloys, particularly designed to be most efficient in this special function of ladle inoculation, has come only recently. The graphitizing type of ladle inoculators is particularly suitable for those applications requiring a reduction in brinell hardness and drastic chill reduction. These alloys are completely effective softening treatments since the excess material (that not used up in the treatment reaction) has an inherent softening and weakening effect. The weakening effect of the excess material tends to offset the strengthening effect of the ladle treatment itself, therefore this type alloy is not always of maximum efficiency where strength is of principal importance.

Most graphitizing ladle additions are susceptible to over-treatment ef-

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fects. These effects may not be observed in the laboratory or in test bars. However, commercial castings may be subjected to shrink cavities, blow holes or porosity if the amount of graphitizing ladle treatment is in excess of the amount required for optimum results. This phenomenon seems to be more prominent in green sand molds than in dry sand or baked molds.

Partially for the purpose of eliminating the over-treatment effect, stabilizing ladle treatments were developed. It is well known that under certain conditions, carbide stabilizing alloying elements will promote chill reduction. This is borne out by the fact that small amounts of both vanadium and titanium reduce chill when used as ladle additions in spite of the fact that they are both strong carbide stabilizers. Utilizing this information, alloy manufacturers have succeeded in developing combinations of alloying elements which promote chill reduction and reduce modification but which have an inherent carbide stabilizing effect. Included in these alloys at the present time are V-5, and V-7, proprietory products. These alloys contain chromium, silicon and manganese proportioned to promote chill reduction and the allied effects of ladle treatment without danger of over-treatment effects or loss in strength due to composition change. These alloys have an inherent strengthening and hardening influence aside from any ladle treatment effect. They are particularly valuable for increasing density, wear resistance and strength in castings including light sections or sharp corners which would be liable to chill if no ladle treatment were used. No adjustment of the base iron composition is necessary to maintain physical properties, but because of the chill reduction effect, these alloys do permit lower silicon contents without danger of chill. In addition, the absence of over-treatment effect and the inherent stabilizing effect of these alloys contributes to even greater uniformity of structure and properties than is normally possible with the softening type ladle treatment alloys. Of course, unlike the graphitizing type alloy, these materials cannot be used to reduce brinell hardness. Therefore each type has its own applications.

Both types reduce chill and eliminate modified structures. Both permit more efficient utilization of the benefits of various alloying materials and reduce the effect of the uncontrollable variables. Neither type will eliminate the necessity for good foundry practice, but the practical foundryman will find that the judicious use of a ladle treatment suited to his practice will prove to be one of his most valued tools. Ladle inoculation is the most efficient method of controlling uniformity of structure, permits wider choice of both raw materials and base iron analysis and contributes markedly to uniformity of structure and properties so vital to economy of alloying elements and to efficient foundry practice .

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Gives OPA Data on Gray Iron Costs

A national committee organized to supply information to the Office of Price Administration on the subject of "Price Freezing in the Gray Iron Foundry Industry," met in Washington on May 6, and prepared an extensive report together with statistical exhibits collected from the industry.

In summarizing the report, the committee expressed entire sympathy with the effort to stop the upward movement of prices. It indicated the belief that the gray iron foundry industry cannot absorb the increased labor and material costs which have accrued from Oct. 1, 1941, to the date of Mr. Henderson's letter, Feb. 4, asking that no further advances be made. A freezing date

based on costs not earlier than Feb. 4, according to the committee, will allow the gray iron foundry industry to maintain its important position in the war production effort.

The national committee was made possible through the co-operative efforts of the Gray Iron Founders' Society. That organization arranged for the preliminary meetings which were held in the 19 geographical regions. These meetings organized and elected delegates to a meeting held in Cleveland, April 21. This meeting of delegates elected the following members to serve as the national committee: R. D. Phelps, Francis & Nygren Foundry Co., Chicago, chairman; C. R. Culling, Carondelet Foundry Co., St. Louis; H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J.; R. E. Kucher, Olympic Foundry Co., Seattle, Wash.; F. H. Rayfield, Potter & Rayfield Inc., Atlanta, Ga.; W. L. Seelbach, Forest City Foundries Co., Cleveland; and H. S. Washburn, Plainville Casting Co., Plainville, Conn. In addition to the committee, the OPA invited the following to attend the May 6 meeting: John H. Diedrich, Blackhawk Foundry & Machine Co., Davenport, Ia.; H. P. Good, Textile Machine Works, Reading, Pa.; W. W. Rose, Gray Iron Founders' Society, Washington; and Samuel D. Russell, Phoenix Iron Works, Oakland, Calif.

Book Review

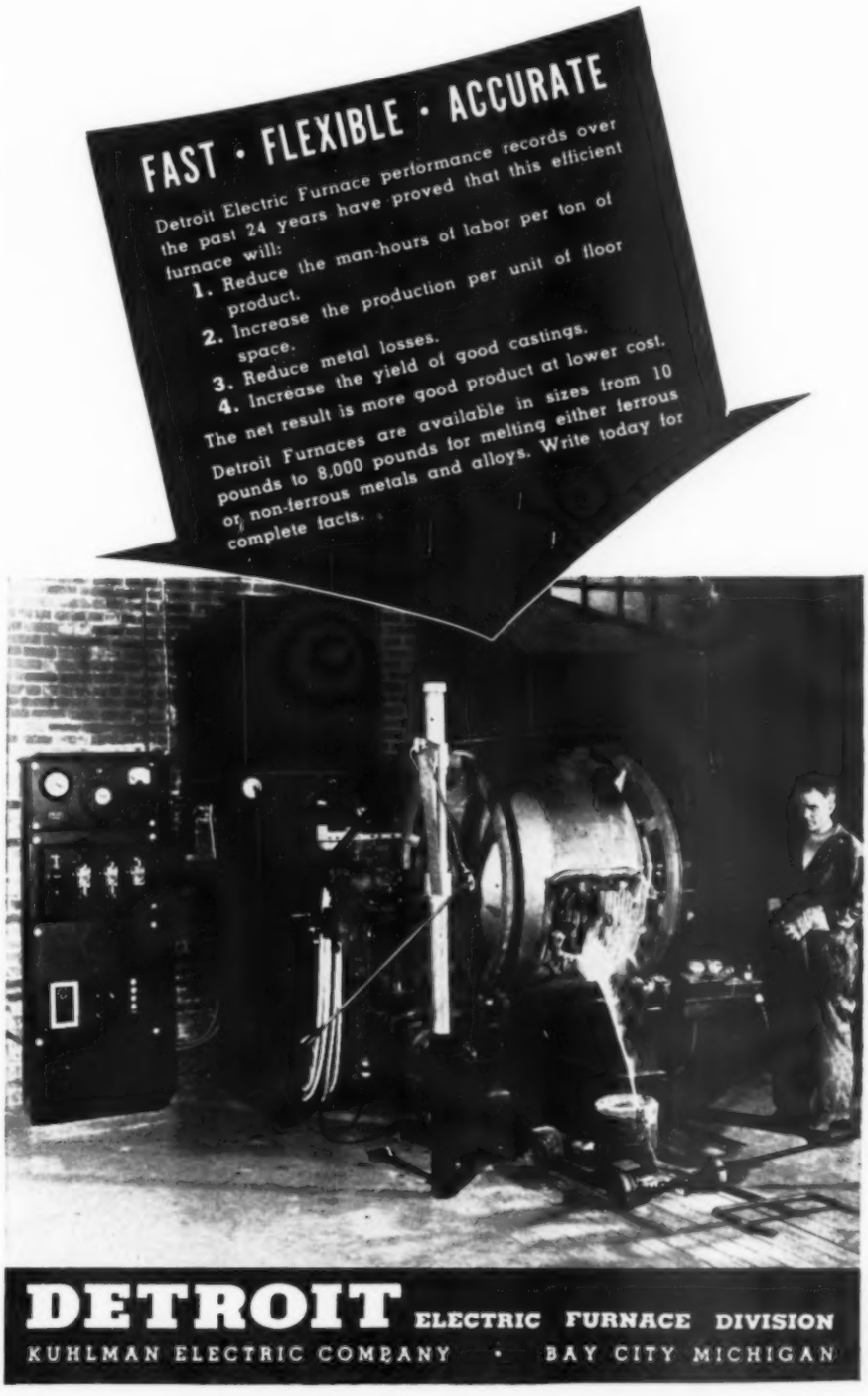
Modern Core Practices and Theories, by Harry W. Dietert, cloth, 532 pages, 6 x 9 inches, published by the American Foundrymen's Association, 222 West Adams street, Chicago, $5 to members and $8 to nonmembers.

This volume, the first devoted entirely to cores, fills a long felt need in the foundry industry. While considerable literature relating to cores has been published, it was widely scattered, and hence, not easily available. Fortunately, that condition no longer holds due to the painstaking work of the author, Harry W. Dietert, internationally known as an outstanding authority on sands and their uses in the foundry. Mr. Dietert is to be congratulated on his excellent job of combining and correlating pertinent information previously published with his own wide knowledge, and well known sand investigations. The new book is a considerably extended compilation of material presented by the author in a series of lectures on cores at the 1941 and 1942 conventions of the A.F.A.

The book is divided into 20 chapters covering various phases of modern core practice which will answer practically any question that might arise on the subject. Topics include core sands used, their selection and location; core binding materials, their types and characteristics; core mixtures for gray iron, steel, malleable and nonferrous castings; storage and conditioning of core materials; mixing equipment, operations, distribution and storage.

Core making methods and equipment receive considerable attention, some 74 pages being devoted to the discussion. Factors affecting core baking are described, and extensive details are presented on core ovens and their control. Core finishing, coating, and handling are discussed as well as methods for determining properties. Other chapters are devoted to controlling core properties, core setting, core shakeout, sand reclamation, casting surface as affected by core sand mixtures, and economics of core production. The closing chapter on defects caused by faulty cores is extremely interesting with the numerous illustrations of typical defects.

The volume also contains a bibliography of literature relating to cores and core practices beginning with the year 1921. A good cross-index aids considerably in locating specific information.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CONVERTING AN IRON FOUNDRY TO MAKE STEEL

(*Continued from page 59*)

tion.

In general, the personnel involved should be the first consideration because it is even more important to secure proper organization than it is to secure proper equipment.

Careful investigation should be made concerning the adaptability of the existing foundry building for the manufacture of steel. Unless very light castings are contemplated, it will be essential to have a traveling crane and the building must be strong enough to carry the runway. Headroom is an important consideration and the distance from grade to crane rail should be not less than 20 feet. Handling facilities are very important, as molten steel must be carried to the molds and poured more rapidly than is necessary for cast iron.

Selection of melting equipment is, of course, important (usually the first equipment to be considered), but it must be remembered that the melting department is only one of the many factors involved. Small and medium sized castings, ranging from 5 to about 1000 pounds, usually require very hot metal, which should be made in the electric furnace or side-blow converter. Either of these units can produce steel with temperatures frm 3000 to 3300°F.

If heavy castings and large tonnages are to be made, the open-hearth furnace, either acid or basic lined, is the logical choice. When making selection of melting equipment, several factors should be considered, such as, adaptability for continuous or intermittent operation, delivery, cost of installation, conversion cost, temperature requirements for the job in question, etc.

A well equipped chemical laboratory able to perform all the usual metallurgical analyses must be included in any plans for the manufacture of steel castings. This laboratory must be under the control of a man with good metallurgical and chemical education. He should be given entire charge of mixtures for the melting department and should supervise technical control for all heat treating and annealing operations. Sand testing apparatus should be included as part of the necessary equipment for a laboratory.

Sand Preparation Important

The most important equipment required for the molding department is a satisfactory sand preparation plant. Steel sand is prepared in a muller type mixer. Molds for steel castings usually are made from a highly refractory synthetic sand, and steel casting temperatures in the mold range from 2900 to 3200 degrees Fahr. In production steel foundries, the sand preparing, reclaiming and distributing system may be elaborate and consist of shakeout equipment, belt delivery of used sand to the reclaiming department, etc. The sand reclaiming department should include magnetic separators for tramp iron, screens to remove extraneous material which is not magnetic, elevators, large hopper over the muller, and belt delivery of prepared sand to hoppers located over the molding machines. This equipment is expensive and requires a high degree of engineering skill for proper installation. In the small foundry producing perhaps 150 to 300 tons of steel castings per month, such elaborate equipment usually is not warranted.

The molder who has made molds for iron castings only will have much to learn. The mold for steel must be rammed much harder. Gates will be larger, brackets and chills unknown to cast iron practice

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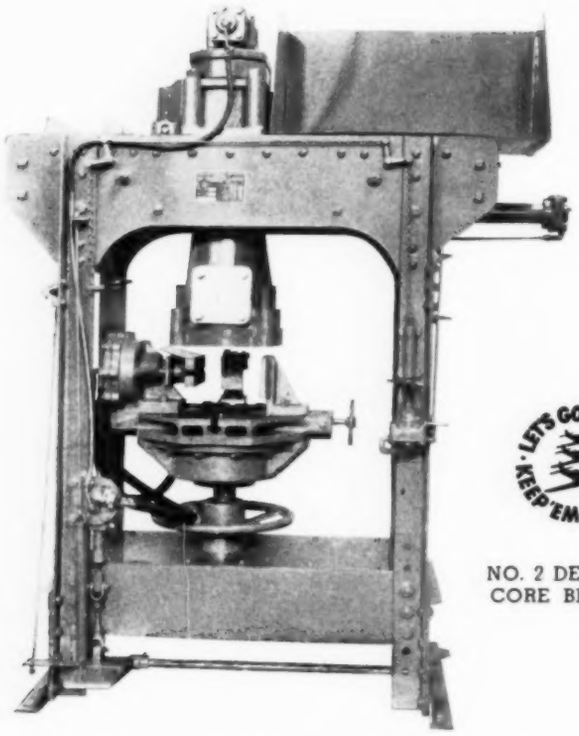

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will be required, and, most important of all, the metal must be fed to counteract shrinkage. This is because cast steel has twice the shrinkage of cast iron and unless large risers are used to feed the shrinkage, the resulting castings will be unsound and full of holes.

Usually the molding machines found in an iron foundry are adaptable for the manufacture of steel castings and this is true to a large extent of the flask equipment.

The core room, if it is well equipped, (with a good oven and a machine for mixing the core sand) will be subject to less alteration than any other part of the shop when changing the production from iron castings to steel.

Pouring operations are usually under the supervision of the molding department and, as mentioned previously, steel must be handled much more rapidly than cast iron.

The cost of cleaning steel castings is a much more expensive operation than is found in any iron foundry. This means that considerably more equipment is required. The usual sequence of operations in the steel foundry cleaning room is about as follows: (1) Removal of small gates on a sprue cutter; (2) Blasting for large castings in a room-type machine and small castings in a blast barrel; (3) Flame cutting to remove heavy gates and risers; (4) Grinding; (5) Chipping; (6) Welding; (7) Grind where welded; (8) Anneal or heat-treat; (9) Reblast to remove annealing scale.

Cleaning Is Expensive

All of these operations require equipment—much of it expensive. The cost of cleaning steel castings may very well be higher than the cost of molding and core making, especially if molding practice and sand preparation is not properly performed. Chipping operation, performed with pneumatic hammers is much more expensive than for gray iron and a plentiful supply of compressed air is essential to supply chipping hammers and blast rooms.

Annealing and heat treating, while part of finishing operations, must be given special attention. The cleaning room foreman probably will have charge of loading the cars and operating the furnaces, but he should do so only under the direction of the metallurgist. Government specifications for the physical properties of castings for ordnance work are exacting, and can only be met by careful control of the operation. Furnaces should be equipped with automatic pyrometer control. The metallurgist should specify proper temperatures for the various grades of steel produced. Only by proper heat treatment can the best physical results be obtained.

Many iron foundries have already made the conversion from iron to steel and many more will be required to do so if the present war demand is to be met.

Already a number of gray iron plants have been converted with excellent results and the idea is entirely practicable if all the requirements are fully realized and provision made to meet them. The writer does wish to caution small iron shops, whose buildings and equipment are inadequate, that it takes more than the mere addition of a melting furnace to become a successful producer of steel castings. In general, about $100,000 must be invested per 100 tons of steel capacity per month.

United States Department of Labor, Division of Standards, has published a digest of state and federal labor legislation enacted July 1, 1940 to July 1, 1941. The publication summarizes the text of labor laws enacted by 43 state legislatures as well as by legislatures in Alaska, Hawaii and Puerto Rico. Copies of the digest may be obtained from the Superintendent of Documents, Government Printing Office, Washington, for 10 cents each.

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PROTECTING LIFE PROPERTY AND PRODUCTION

(*Continued from page* 61)

than one watch post should be provided. Duties of the fire watchers are to advise the plant defense co-ordinator of location of fires, explosions or falling of incendiary bombs on the property. Watchers should be protected or sheltered by sand bags or protective walls and roofs where possible. They should be provided with steel helmets and communication facilities.

11. *Rescue Facilities.* Plant fire protection department should be equipped with fire ladders, ropes and other accessories for the purpose of making rescues from multi-story buildings.

12. *Gas Masks and Respiratory Protective Equipment.* It is extremely important that there be sufficient masks provided for combating smoke, industrial gas leaks and toxic fumes from any process that might be hazardous in the event of emergency. Be sure that the respiratory protective equipment is designed to protect the wearer against the hazards contemplated.

13. *Inspection.* Now more than ever it is necessary to frequently make plant inspections to make sure that everything is being done to minimize fire hazards and that all fire-fighting equipment is in condition for instant use.

Old hose should be tested to make sure that it will withstand the water pressure. Portable extinguishers should be checked to make sure they are filled and contain the right extinguishing material; also that they have not been tampered with. Water and sprinkler valves should be checked and if necessary, identified with markers as to the areas they control.

(b) *Plant Police Protection Group*

1. *Plant Police Chief.* The plant police protection department should be headed by a plant police chief. He should have a good knowledge of police activity and be capable of inspiring confidence and building up morale.

2. *Size of Plant Police Department.* Number of men required to police a plant will vary according to the size of plant, number of employes, amount of fencing around plant, number of entrances for pedestrians, trucks and railroads, and other local factors.

3. *Identification of Police Department Personnel.* Members of the plant police department should be provided with a distinctive uniform, cap or badge that will give evidence of their authority in the performance of their respective duties except in the case of certain members having more or less free lance assignment on so-called under-cover work among the employes in connection with sabotage prevention work.

4. *Deputizing Members of Police Department.* Depending upon the size of the property and the number of employes, also on the number of men engaged in the police service, one or more members of the department should be deputized by the local police department or by the sheriff's office, in order to handle emergency cases.

5. *Watchmen.* All gates and entrances to the property that must remain open during the course of business should be manned by watchmen and no one should be allowed to enter un-

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less he has business there and until he has been identified and given a pass.

6. *Patrols.* Patrols should be organized over regular designated beats taking in all strategic areas, property and fence lines at all times of the day and week but the time of passing a particular point should always vary.

Trained watch dogs accompanying the patrolmen greatly increase the efficiency and coverage of the patrolmen and furthermore, afford additional protection to the patrolmen when traveling isolated areas.

7. *Inspection of Trucks and Other Conveyances.* All motor trucks and other conveyances should be stopped outside the entrance to the plant and the reason for entry determined. Interior and bottoms of trucks, trailers and other conveyances so stopped should be inspected. Inspection of all conveyances should be made outside the gate to the property, with the gate closed.

The plant gate should not be opened where the conveyances enter until after the inspection. Consideration, of course, must be given to the movement of traffic in the street.

8. *Inspection of Railroad Cars.* All railroad cars switched into the plant should be opened immediately and inspected.

9. *Inspection of Ships, Boats and Barges.* All ships, boats and barges tying up at the docks of the plant should be checked immediately.

10. *Truckers and Others not to Roam the Plant.* Truck drivers or crews from vessels should not be permitted to roam about the plant. They should be made to stay with their equipment.

11. *Employes' Packages and Lunch Boxes.* In plants which are producing material essential to the war effort, all packages and lunch boxes brought in by the employes should be opened and inspected. All packages and lunch boxes of employes leaving the plant should be checked to make sure no drawings, information, material or supplies essential to the war effort are being removed from the premises.

12. *Persons in Plant Without Identification.* Police or any employe should stop and take to the plant headquarters any person found in the plant without permission or identification.

13. *Guarding of Strategic Equipment and Areas.* During times of a blackout either the plant police department or selected volunteer wardens from the plant personnel should be delegated to guard unoccupied buildings containing equipment, also substations, boiler and power houses, water supply systems, main water valves and other strategic areas.

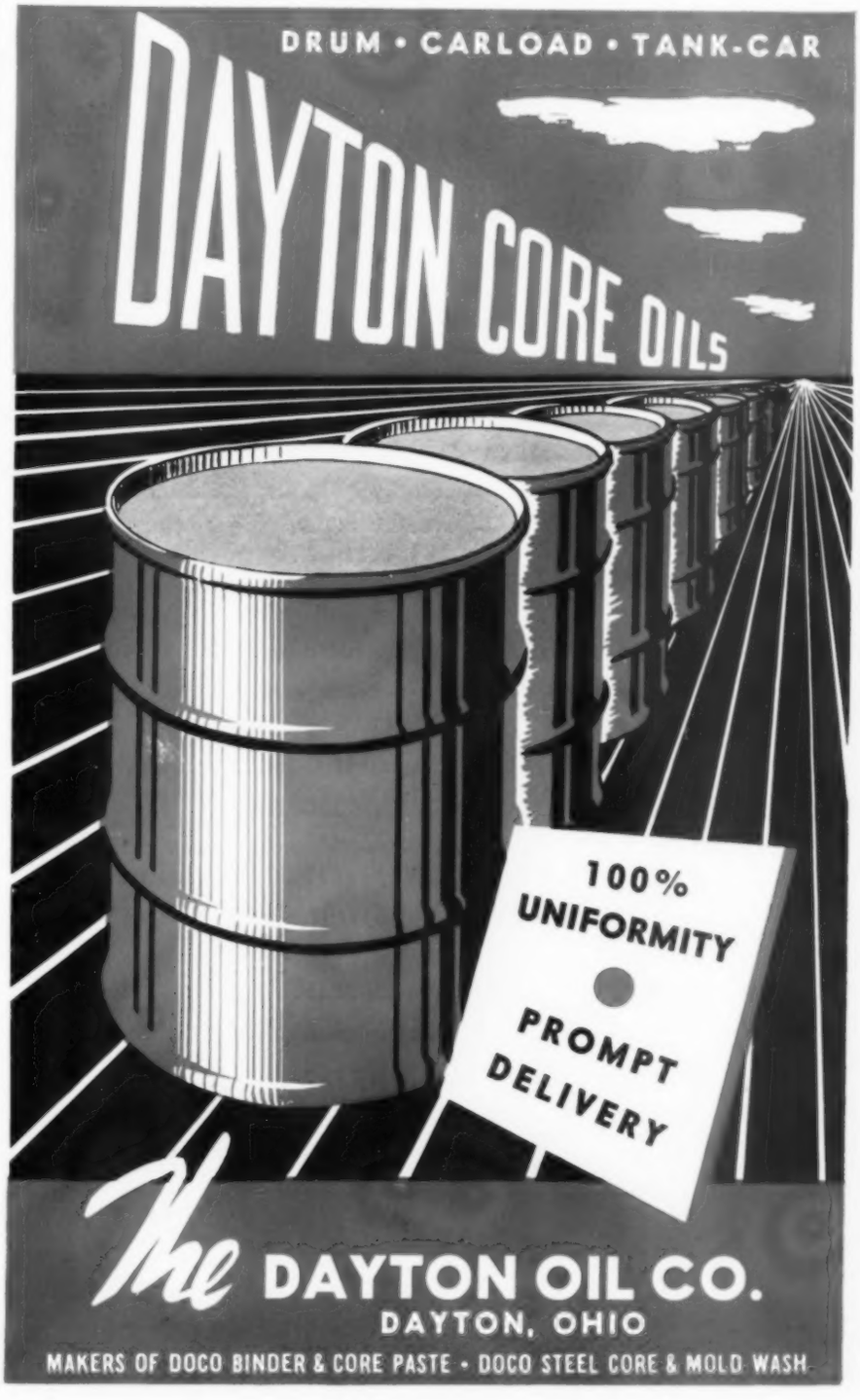
14. *Traffic Control.* In larger plants having considerable amount of roadways the plant police should control traffic at all times.

15. *Discipline and Morale.* Members of the plant police department should be taught how to maintain discipline in times of emergency and how to build up the morale and confidence of the plant employes. This is extremely valuable in order to minimize danger of panic in case of trouble.

16. *Arming of Police.* Feasibility of arming part or all of the plant police force or auxiliary guards should be a policy for the management to determine. Authorities believe that the plant police force should be armed.

(c) *Plant Medical Department.*

1. *Plant Medical Chief.* Plant medical department should be headed by the plant physician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or a registered nurse depending on the size of the plant and according to the medical and first aid setup in the plant.

2. *Size of Plant Medical Department.* Plants already having a medical set-up should give consideration as to whether the personnel and equipment should be increased to handle the work in case of emergency. Plants with no medical set-up whatever (possibly because they do not have many employes) should give consideration to establishing at least first aid facilities to be handled by someone trained in first aid work. Wherever possible consideration should be given to at least employing a registered nurse. Accessibility to local hospitals should be one of the factors to be considered in the size of the first aid or dispensary unit to be set up in any plant.

3. *Dispensaries and First Aid Stations.* Depending on the dispensary and first aid station set-up now in effect, a careful study should be made to see that stretchers are available. In large plant areas stretchers should be located throughout the plant. The supply of blankets, dressing tables, bandages, splints, and other first aid materials should be checked and replenished.

4. *Training for First Aid.* Where medical personnel is already available, or in plants that do not have these facilities at the present time, at least 5 per cent of the employes of the plant should be trained in the equivalent of the Red Cross first aid course.

5. *Care of Casualties.* Those on duty in first aid stations should provide as much of the first aid service as possible. The seriously wounded or injured should be tagged and identified and contacts should be made with the proper dispensaries or hospitals for the immediate evacuation of the wounded and injured so that they may receive prompt attention.

6. *Treatment for Poison Gas.* To handle casualties resulting from contact with poison gas, decontamination depots are necessary and should be staffed by adequately trained personnel to handle such cases. It shall be necessary that separate depots be provided for each sex. Contaminated clothing should be entirely removed, the patient liberally bathed in a shower bath and the body covered with solutions or ointments such as hypochloride of lime to neutralize the effects of gas burns.

7. *Sanitary Service.* The plant medical chief should check the potability of water in the plant to be sure that there are no cross connections that would contaminate the water supply. This is especially necessary in case of damage to the plant and haste is made to get the services operating again.

(d) *Plant Maintenance Group.*

1. *Plant Engineering Chief.* The plant maintenance group should be headed by a plant engineering chief. He should be thoroughly acquainted with the plant facilities and all utilities serving the plant; he should be capable of supervising the regular plant electrical, millwright, pipe and steam fitter, rigger and construction department crews.

2. *Duties.* Duties of the plant maintenance group are numerous and are concerned primarily with keeping the plant utilities in operation to fight fires and to see that the undamaged portions of the plant are kept operating and to limit the damage. This is especially important where continuous operation and processes are involved so that there will

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be no loss of or damage to the material or to equipment such as melting units and continuous annealing, normalizing and heat treating furnaces and the like. This group is responsible for demolition, repairs and salvage work and clearing away wreckage.

3. *Selection of Maintenance Men.* All maintenance men who are called upon to make installations and repairs throughout the plant should be checked carefully as to their record and loyalty because these men have a more or less full run of the plant and many times work without supervision.

4. *Location of Strategic Facilities to be Known.*

(a) *Outside Utility Service.* Location of all outside utility services entering the plant should be known so that in cases of emergency the service may be shut off. This applies to electricity, industrial gas, water, central station heating and the like. All main incoming substations and valve pits or houses should be kept under lock and key against tampering.

If the utility company only has the right of access to the substation main breakers or valves and they will not give any authorized person in the plant the right of entry to the control equipment in case of emergency, the name, address and telephone number of the utility company supervisor having jurisdiction should be had so that contact with the supervisor may be made immediately in case of trouble.

(b) *Inside Service Facilities.* Location of all main electrical breakers serving various power distribution lines within the plant should be known and identified as to the area served by the line. Also, all water and sprinkler shut-off valves or industrial gas valves controlling buildings or certain plant areas should be known and identified so that these facilities can be controlled in cases of emergency. Any other service such as oil lines, steam lines and the like should be checked and shut-off valves should be known and identified.

5. *Tools.* Tools and emergency equipment should be kept on hand and accessible for instant use. Power or hand-pulled trucks should be provided for getting the equipment to the job. Equipment should include such demolition apparatus as gas cutting and welding equipment that might be necessary in case of wreckage.

6. *Respiratory Protective Equipment.* Gas masks or respiratory protective equipment should be on hand for use in the event the maintenance crew has work to do around toxic gases, vapors or fumes. This protective equipment must be suitable for the types of toxic materials expected to be encountered.

7. *Explosion-Proof Lights.* Explosion-proof type of flashlights should be available in case the maintenance crew has to work in the presence of flammable or explosive materials and gases.

(H)—*Protective Apparel*

(1) *Outdoor Assignments.* Any employes assigned to outdoor duties during a blackout or bomb raid, or that have to do with wrecking and demolition work should be provided with heavy metal helmets to minimize possibilities of injuries.

(2) *Protective Clothing.* Guards and patrols that are required to patrol outside areas should be provided with water repellant apparel so that the patrols will function at all times during wet weather. Employes assigned to fire-fighting squads should be provided with

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protective clothing usually worn by firemen when fighting fires. Depending on the fire hazards in the plant such as oil, solvents and other highly flammable commodities should determine whether or not to provide asbestos and fire-resisting apparel to certain of the fire-fighting crew.

SECTION VIII

BUILDINGS AND PROPERTIES

(A)—*Existing Plants.* Great majority of plants, factories and other work places existed before any actual war activities started. Relatively few new plants will be built for operation by civilian organizations for war products or otherwise, compared with the total plants in existence. The problem of making a series of definite recommendations which would apply to all kinds of property is therefore extremely difficult. Protection of properties should be considered as they exist at present and this protection should depend on layout, property lines, type of construction and type of manufacture conducted in such places and should also depend on available police and fire-fighting organizations provided by law or statute covering the district.

(B)—*New Buildings and Properties.* Plant expansions or new plants will be built by private enterprise because of greater need for military equipment. It is suggested, however, that unless there is insistence on the part of some federal agency or authority when new buildings, or extensions of existing buildings, or entirely new plants are created, that the following two thoughts be kept in mind:

(1) Adaptability of the new facilities with the current need for military production.

(2) Use of these new facilities after the war is over, and the facilities used for peace-time production.

NOTE: Such considerations usually lead to much lower cost construction, thereby saving vital materials and labor. Then too, the new facilities being more readily adapted to peace-time production of civilian requirements, have a higher peace-time value. Buildings designed with complete blackout features require expensive auxiliary equipment such as air-conditioning. Many times bombproof and gasproof emergency rooms for employes are required. Also, it is usually requested that the floor area be broken up into smaller buildings, separated by considerable open space between them and this construction is extremely expensive and usually not suitable for efficient plant operation in peace-time.

(C)—*Fencing.* All plant properties where the buildings are not on the property line and are engaged in the production of any war material directly or indirectly, should be fenced to exclude unauthorized entry. These fences need not necessarily conform to property lines provided the fences protect the buildings and operations. Consideration should be given to gates to permit entrance of fire apparatus if necessary.

Fences should not be less than 8 feet high to the top strand of barbed wire or sharp picket. If wire fencing is used, the wire should not be less than No. 9 U. S. gage and the maximum opening in the mesh should not be greater than 2-inch. At least three strands of barbed wire on 6-inch centers should be used on top of the fence unless other equally effective devices are used. If barbed wire is used the barbs should be 4-point with the barbs spaced 4 inches apart.

Fencing should be so constructed that it cannot quickly or easily be broken through or climbed over. Supporting posts should be sufficiently strong to withstand wind pressure or heavy sleet storms.

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As pressure inside valve is always balanced, it cannot become pressure locked, is always easy to operate. Designed for a maximum of 3500 P.S.I. on oil hydraulic applications. *Not* suitable for water except when anti-rust compound is added.

NOPAK Jolt-Squeeze Valve

Has same operating principle as NOPAK 4-Way Valve but differs in operating cycle. Eliminates leaks, repairs, maintenance; reduces operators' fatigue, steps-up production.

1. This Balanced Hy-Pressure Hydraulic valve has demonstrated its adaptability to Straightening Press operation in foundries. Easy manipulation at high pressures, freedom from "pressure locking" and full pipe-area through valve, accelerate the operating cycle. Operators' fatigue is minimized; work capacity stepped-up.

2. The NOPAK 4-Way Jolt-Squeeze Valve replaces two 3-way valves formerly required for Jolt-Squeeze or Squeeze-Draw Molding Machines. It is now standard equipment on many such machines; specified as a standard replacement in many foundries. Embodies the patented NOPAK bridged-disc principle; is permanently protected from grit erosion.

For complete information on these and other NOPAK Valves adapted to foundry use, write for Bulletin 84.

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DESIGNED for AIR or HYDRAULIC SERVICE

A 3763-3

Fencing should be placed close enough to the ground to prevent crawling under, and the ground directly under the fence should be packed sufficiently hard to prevent quick digging out in order to crawl under the fence. If the ground conditions are such under the fence that the ground can be easily displaced, spikes or scrap metal about 2 feet long can be driven into the ground directly under the fence on approximately 12-inch centers. See Fig. 2 for fence suggestions.

(D)—*Gates and Entrances.* All gates and entrances through fences, or all doorways into buildings where there is access from outside the plant property, should be kept locked unless manned by a guard, watchman or others in charge of the gates or entrances. This rule should also apply to roadway and railroad gates wherever located.

(E)—*Other Means of Entry to Properties and Strategic Areas.*

(1) *Conveyors.*. Conveyors and other material-handling apparatus located on the property line or serving strategic areas such as power houses, boiler rooms and the like, for the purpose of unloading or loading material and supplies, should be studied carefully to determine the proper method of guarding against the possibility of unauthorized entry into the plant or strategic area.

(2) *Sidewalk Manholes.* Coal and material chutes or basement elevators and conveyor openings onto the sidewalk or outside strategic areas, such as power and boiler rooms and the like, should be locked when not in use to guard against unauthorized entry.

(3) *Service Tunnels.* Service tunnels, whether for pedestrian, trucking or utility purposes, when connected with areas outside the property line or serving strategic areas within the plant, should have all strategic entrances locked against unauthorized entry.

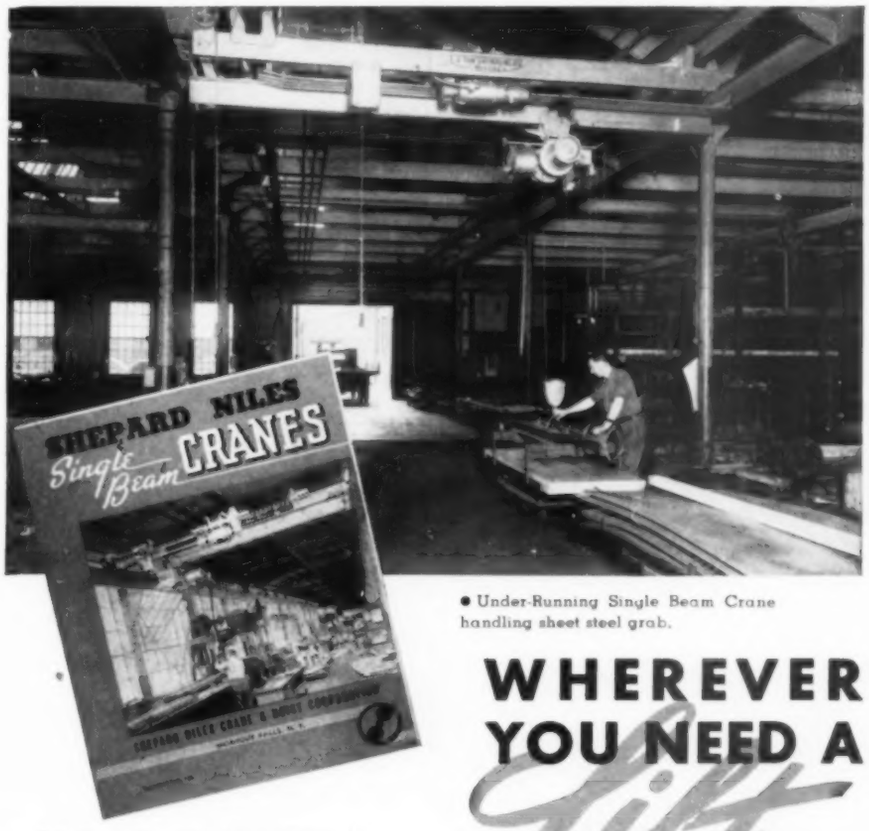
(F)—*Window Guarding.* Windows in buildings on property lines should be screened or grated, or otherwise protected to prevent any possibility of unauthorized entry. Such protection should extend at least 8 feet above ground level, top of railing, or any other fixed object that might be used to stand on. If screens are used, strands of wire should be not less than No. 10 U. S. gage, and the mesh should not be greater than 1½ inches.

These window guards should be anchored securely and fastened on the inside of the guard to the window frame so that they cannot be removed from the outside.

(G)—*Trees, Brush, Material, Etc.* All rubbish, brush, high grass, weeds, trees, material and the like that could hide a person in prone position or a person standing, should be cut down and moved away so as to maintain as nearly as possible, 20 feet of clear, unobstructed ground view along both sides of any fence or on the outside of any building along the property lines. Weeds, grass and brush should be cut frequently to maintain an unobstructed view.

(H)—*Lighting at Gates and Entrances.* All gates and entrances through fences and buildings on the outside should be lighted so that the full, open area of the entrance is lighted with an average of 10-foot candles measured at ground level. Such light should be easily extinguishable in event of a blackout and replaced by lights not visible from the air.

(I)—*Lighting Along Property Lines and Strategic Areas.* If lighting is to be employed to light the property lines or such strategic areas as substations, engine rooms, boiler rooms and the like, the lighting should be so arranged as to shine down on the area to be illuminated with careful attention being given to locating the lighting so as to minimize the casting of shadows and thoroughly lighting the areas involved.



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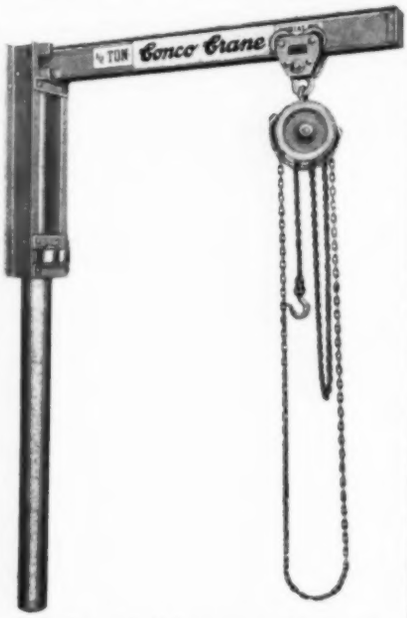

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When lighting is used for this purpose the intensity should not be less than 5-foot candles in the darkest spots to be protected, measured at ground level. Such light should be easily extinguishable in event of a blackout and replaced by lights not visible from the air.

(J)—*Protection of Strategic Installations.*

(1) *Boiler Room and Power House.* Boiler rooms and power houses should be kept under lock and key at all times. No unauthorized person should have access to these premises. Windows should be guarded in the same manner as required under (F) of this section.

(2) *Transformer Installations.*

(a) *Vault Installations.* Installations of transformers in vaults constructed of masonry or concrete should be kept locked at all times against unauthorized entry.

(b) *Original Installations.* Installations of transformers located in the open, either indoors or outdoors, should be surrounded completely by fencing at least 8 feet high to the top strand of barbed wire. Fencing shall conform to (C) of this section.

As much space as possible up to 10 feet should be kept between the transformer or other electrical equipment within the enclosure and the fence. Entrance to such enclosure should be kept under lock and key at all times.

(c) *New Transformer Installations.* All new power transformer installations and lighting transformers extremely vulnerable and important to the operations, should be made within masonry or concrete walls with due regard to minimizing the number of doors, windows, skylights and ventilators, to prevent acts of sabotage unless the modern type of metal clad or air-cooled units are installed or wherein all the equipment is protected against injury and external short circuits.

The openings such as doors, windows, skylights and ventilators should be so located or protected with barriers or baffles that the electrical equipment within cannot be reached with rods, water or other objects.

(K)—*Utilities Serving the Plant.*

(1) *Location.* Know definitely where each utility enters the plant. This includes electric power, light, water, telephone, gas and the like.

The utility company should be requested to make an inspection of the facilities serving the plant to determine if it has taken all the reasonable precautions against interruption in service and against acts of sabotage. The plant should also request such utilities to make

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an inspection of the plant with the idea of making recommendations for furthering the facilities within the plant.

NOTE: Most utility companies have received certain instructions regarding safeguarding their own operations and many times their experience is of value to their customers.

(2) *Two-Way Utility Service.* Wherever it is possible, and depending upon the kind of service rendered, particularly electric power service and also the importance of the operations, the utility company should be asked to provide service from two different substations or sources of supply to the plant so that in the event of failure of one of the systems, service may still be obtained from the other source and if possible, have the circuits enter the plant from different routes.

(3) *Cable Manholes.* High tension and main distribution cables and all important underground ducts should have the manhole covers in all pits locked or fastened down by means of locks, bolts and screws, or by spot brazing the cover to the manhole frame in several places.

(4) *Exposed Bus Bars, Cable and Electrical Equipment.* Whenever any bare bus bars, cables or electrical equipment are within reach of window, door, screen, fence, roof, ventilator or skylight so that metallic rods, chains or water can be thrown into them, barriers or baffles of at least No. 12 U. S. gage steel or asbestos cement sheets not less than ¾-inch thick should be installed to deflect any objects thrown into them and thereby prevent short circuits and burnouts. The adequacy and extent of such protection necessarily should depend on the importance of the equipment and the local conditions and installation. It is well to ask yourself the question: "What can I do to damage the facilities without being noticed?" and then provide the safeguards.

(L)—*Air Compressor Intakes.* If compressed air is used in the plant, every means should be taken to insure continuity of service. All compressor intakes within reach should be protected by shields or fencing in addition to any regular dust trap installed so that it is impossible for anyone to throw abrasive material into or near the intake. Whenever possible extend the intakes high enough out of reach, even above roof level.

(M)—*Exterior Fire Escapes and Building Ladders.* All fire escapes and building ladders on buildings on the property line should be so constructed that they are not acces-

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sible from the ground. Any such escapes or ladders within the plant property that serve large expanses of roof or that could afford hiding for persons should be cut off at least 8 feet from the ground.

(N)—*Protection of Open Water Supply Systems.*

(1) *Wells and Storage Tanks.* All wells and storage tanks used either for sanitary or drinking purposes or for industrial and fire purposes, should be safeguarded against contamination such as would affect the potability of water by putting in foreign matter or that would clog pumps and equipment. Such safeguards should consist of locked manhole covers or the area fenced off against unauthorized entry.

(2) *Cooling Ponds and Reservoirs.* All cooling ponds and water reservoirs where there is a hazard of contamination from foreign matter being thrown into them that would cause damage to equipment should be fenced and put under lock and key. The fencing should conform to that required under (C) of this section.

(O)—*Parking Areas.* Wherever possible, parking areas that are provided for the employes' and visitors' automobiles should be segregated from the plant operations by means of a fence as specified under (C) of this section.

Every attempt should be made to prohibit employes and visitors from parking within the operating sections of the plant in order to eliminate possibilities of theft of strategic material and/or equipment and to minimize possibilities of sabotage or fire.

Code of Practices

THE code of recommended practices for the protection of life, property and production in the foundry industry during the war, is reproduced in this and subsequent issues through the cooperation of the American Foundrymen's Association, and the industrial hygiene codes committee of that organization.

Since the subject matter covered in this code is of vital importance to every foundry, many undoubtedly will wish to procure the complete report before publication can be finished in The Foundry. The complete code in multigraph form may be purchased through the American Foundrymen's Association, 222 West Adams street, Chicago, for $1.50.

The Editors

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NAVY YARD DEVELOPS TECHNIQUE

(Continued from page 53)

220 quarts reclaimed sand A.F.A. grade 5; 40 quarts silica clay; 102 quarts silica flour; 20 quarts cereal binder. This mixture is tempered with molasses water 30 to 1 to a moisture content of 6.5 to 7.00 per cent. Green sand compression strength average 4.5 pounds per square inch. Average tensile strength baked 1 hour at 450 degrees Fahr., 60 pounds per square inch. For extra heavy castings the silica flour is increased to 300 or 350 pounds which lowers the permeability to 40 green, 48 dry.

Facing sand for air dried molds—770 quarts sand grain fineness 50 to 60 with 75 per cent retained on three sieves; 20 quarts bentonite; 8 quarts cereal binder; 6 quarts silica flour; 6 quarts silica clay. Moisture 3.5 to 4.00 per cent; permeability green 138 to 163; minimum dry 173. Green strength compression 3.00 to 3.5 pounds per square inch. Dry tensile strength (room temperature) minimum 25 pounds. Sinters at 2450 degrees Fahr.—washed 2650 degrees Fahr.

Core Sand Mixtures

Oil facing sand—220 quarts silica sand, 50 to 60 grain fineness number; 550 quarts molding sand grade 5-D; 100 quarts silica flour; 8 quarts cereal binder; 20 quarts core oil. Tempered with molasses water to a moisture content of 6.5 to 7.00 per cent. Green compression strength 4.5 pounds per square inch. Average green permeability 50, dry 73. Average tensile strength baked 1 hour at 450 degrees Fahr., 35 pounds per square inch.

Regular core sand—220 quarts molding sand 5-D; 220 quarts silica sand grain fineness 50 to 60; 150 quarts silica flour; 10 quarts core oil. Moisture 6.0 to 6.5 per cent with molasses water 20 to 1. Permeability green 73, dry 102. Green compression strength 2 pounds per square inch. Average tensile strength 60 pounds per square inch.

Core sand for heavy work—220 quarts molding sand grade 5-D; 220 quarts silica sand grain fineness 50 to 60; 8 quarts silica clay; 300 quarts silica flour; 10 quarts core oil; 4 quarts cereal binder. Tempered with 20 to 1 molasses water to a moisture content from 6.5 to 7.0 per cent. Permeability green 28, dry 42. Average tensile strength 75 pounds per square inch, baked 1 hour at 450 degrees Fahr. Green compression strength 4.0 pounds per square inch.

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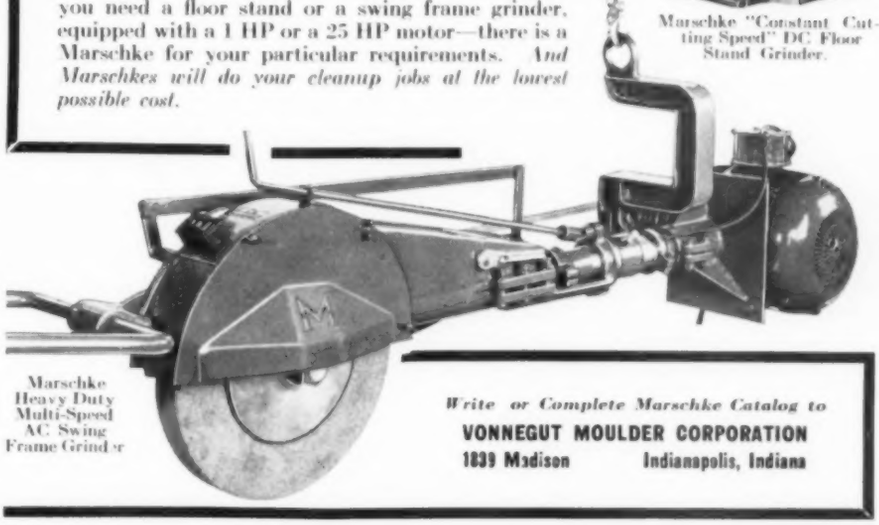

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ness 50 to 60; 4 quarts bentonite; 10 quarts silica flour; 6 quarts cereal binder; 10 quarts core oil. Moisture content 5.0 to 5.5 per cent with 20 to 1 molasses water. Permeability green 112, dry 156. Average tensile strength 90 pounds per square inch. Green compression strength 2 to 2.5 pounds.

Core and mold wash—35 gallons water; 200 quarts silica flour; 4 quarts bentonite; 8 quarts emulsified linseed oil; 3 quarts molasses or dextrine. The oil is added to the water. Silica flour and bentonite are mixed dry and added slowly to the water-oil combination. Mixture is agitated vigorously for sufficient time to soak the bentonite and break all lumps. The molasses is added last and is mixed with water before it enters the bath.

Molds Are Air Dried

Practically all the small and medium weight castings up to 1000 pounds are made in air dried molds. The molds are made, gated and headed in the usual manner, coated with silica wash and then allowed to air dry for an average period of 24 hours. By that time nearly all the moisture has evaporated and to the touch the face of the mold is almost as hard and firm as a mold dried in the oven. This development has been pushed to a gratifying high state of perfection. The extra floor space required is compensated for by the greater amount of oven space available for molds that have to be dried.

A battery of 8 drying ovens 8 x 12 x 24 feet and opening into the center bay is equipped with tracks and heavy cast steel cars. The ovens are heated with oil. Main pipe, branches and valves are located in a tunnel at the back of the ovens. Four smaller ovens 10 x 12 x 13 feet fired with gas are available for drying the cores. These ovens are in the east bay in the vicinity of the core department.

Molds are cored, assembled and poured on a large space near the center of the main bay. All metal is poured from large bottom pour crane ladles. On account of congestion due to present abnormal conditions many molds are taken outside the building to cool after they are poured. Transverse tracks and substantial steel cars are provided for the purpose. Similar equipment facilitates movement of the castings from the shakeout to compartments outside the west side of the foundry where they are cleaned by blasting equipment.

Rolls, ingots and other castings for which the molds require to be set up in a vertical position are assembled in a large pit in the main bay a short distance north of the open hearth furnace to facilitate handling and pouring the metal from the ladle and to provide reasonable safety for the men engaged in the work.

Despite the terrific pressure and congestion incident to forcing an abnormal volume of constantly changing jobs through this large shop, safety features and good housekeeping features are maintained to a remarkable degree. Rigging and equipment is under constant inspection, gangways are kept open, flasks not in use in the shop or in the yard are stacked with mathematical exactness, men handling metal are equipped with suitable safety clothing, cleaning room employees wear gloves, safety shoes and goggles. An exhaust system keeps the atmosphere clear, particularly at the shakeout and in the vicinity of the sand preparation equipment.

Through attractive working conditions including a pension after retirement from active service, navy yard foundries have no trouble in maintaining steady personnel, or in increasing personnel when necessary. In the present instance the shop crew represents every state in the Union.

A full time instructor has charge of a carefully selected list of apprentices. In a room in an adjoining building theoretical instruction is imparted one hour per day. For the remainder of the day the apprentices are engaged in actual production work, first on elementary work and later either on individual jobs or as assistants to the skilled craftsmen working on complicated and difficult work.

Book Review

Transactions of the American Foundrymen's Association, 1941, 1146 pages, published by the association for $3.00 to members and $15.00 to nonmembers.

The 1941 volume of *Transactions* contains all of the papers and discussions presented at the 45th annual meeting of the association held in New York, May 12 to 15, 1941. Approximately 50 technical papers are given in full and the entire text is covered with the subject index and author index. In addition the publication carries the annual address of the president, the summary of proceedings of the 45th annual meeting, reports of officers, financial statements of the organization and minutes of board meetings held by the A.F.A. directors during the past year.

George Whiting Co., 1719 North Elston avenue, Chicago, manufacturer of heavy machinery and sprue cutters, has sold its plant to the Defense Plant Corp., and will terminate its business. The plant will be used by A. Finkl & Sons Co., for forgings and armament.

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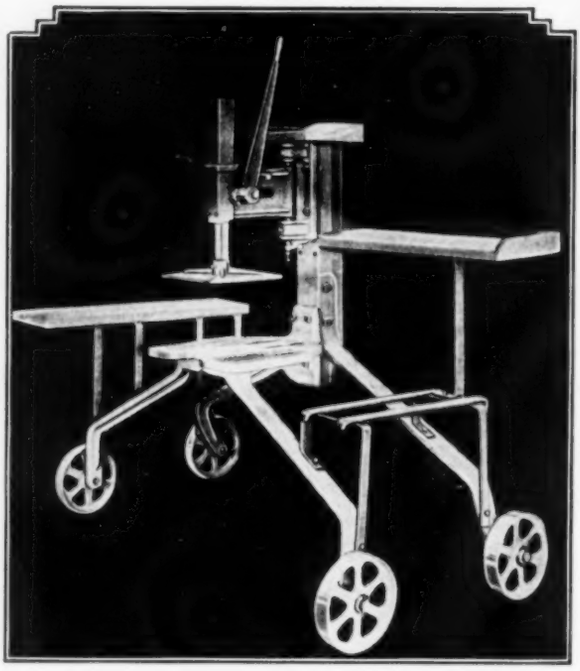

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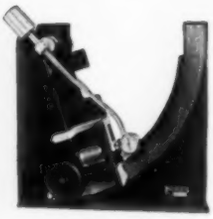
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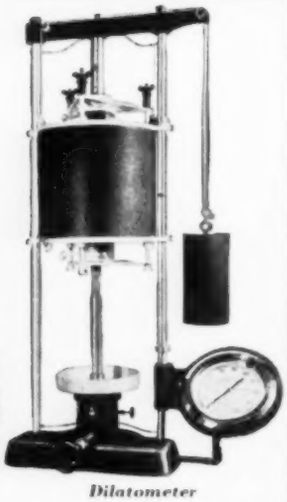
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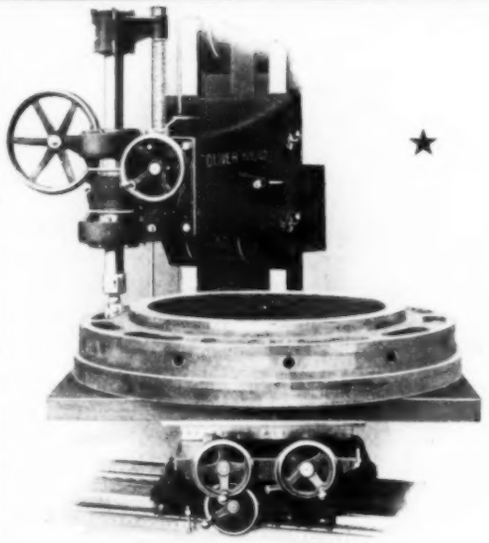

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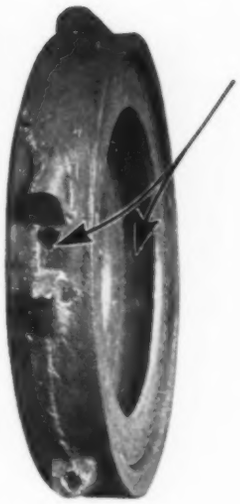

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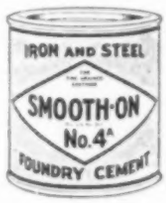

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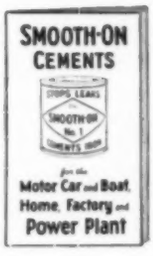

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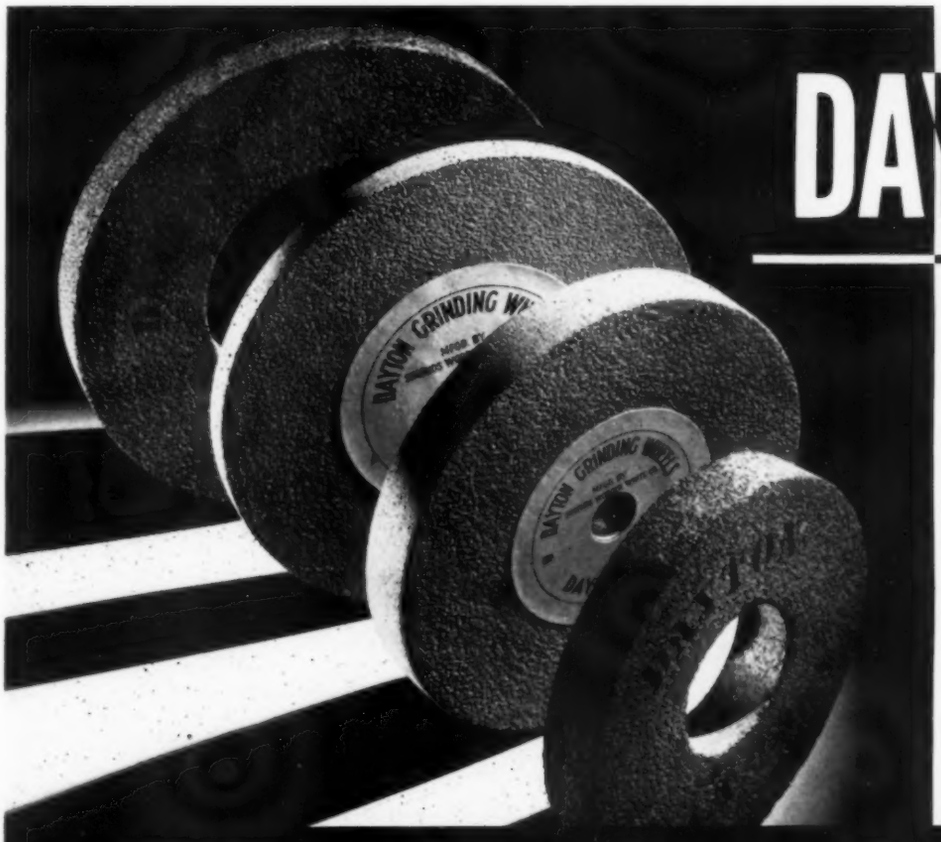

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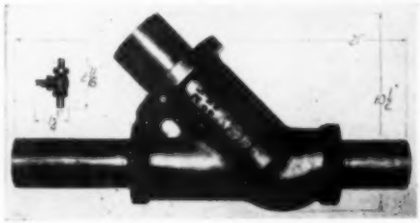

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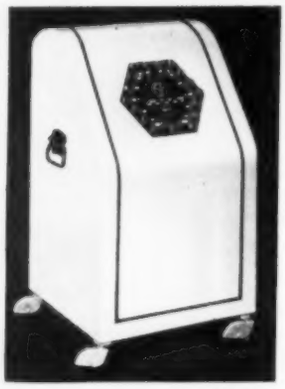

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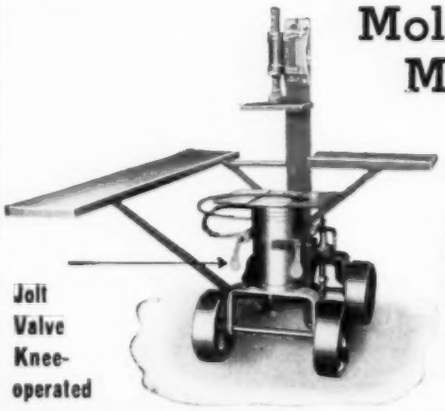

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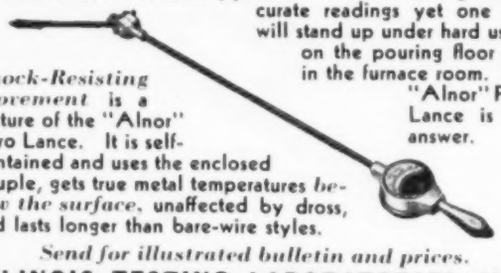

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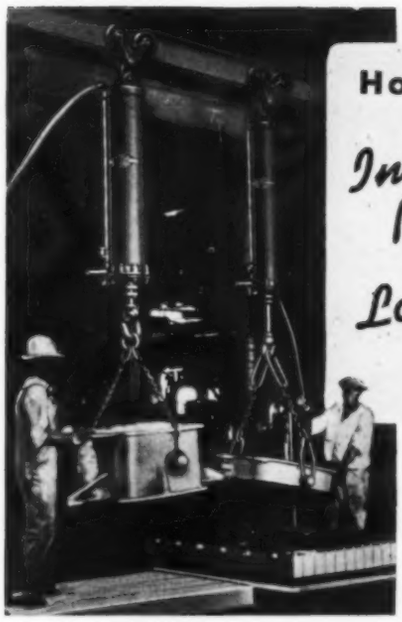

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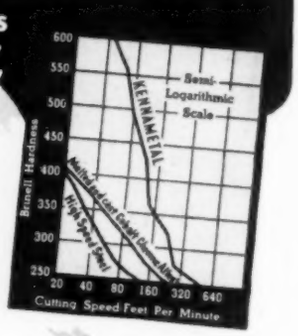

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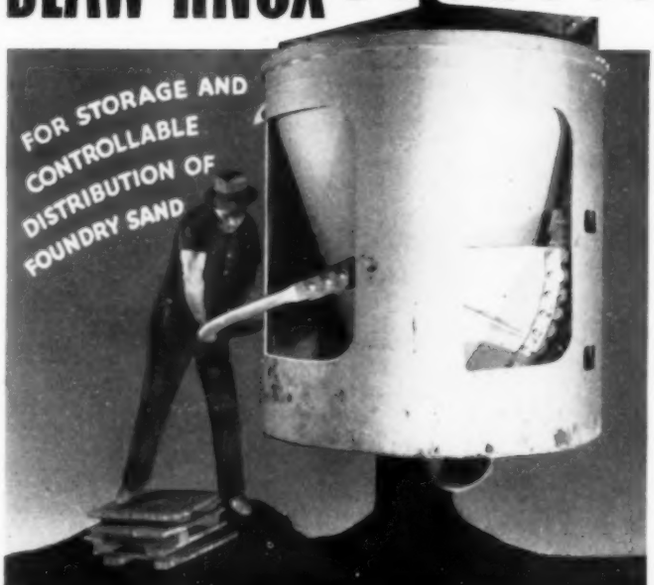

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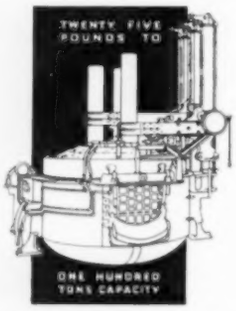

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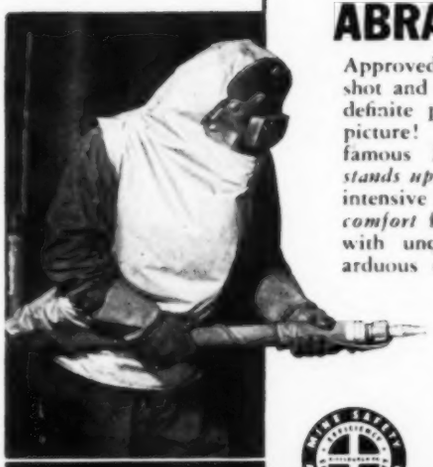

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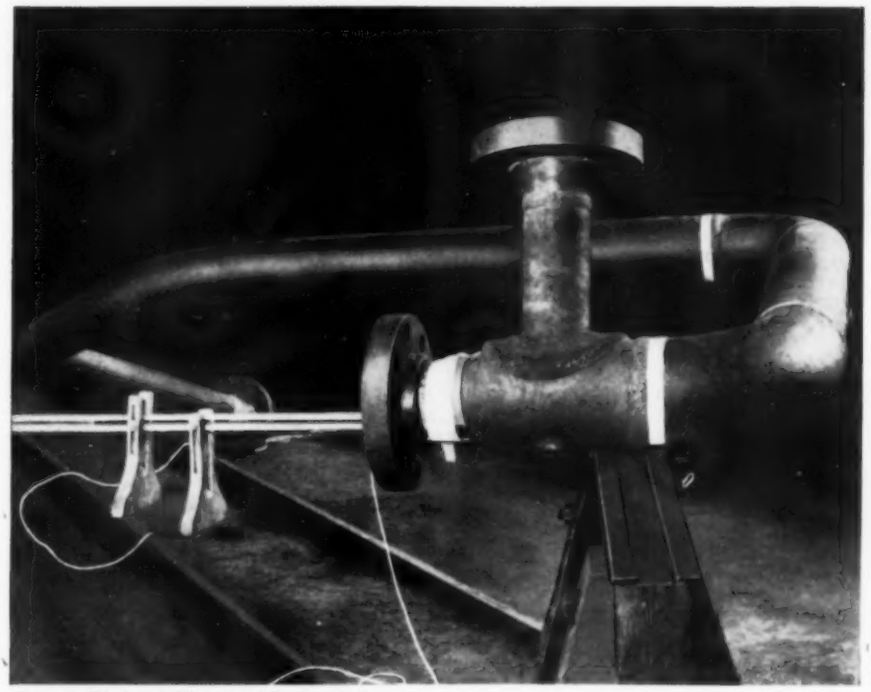

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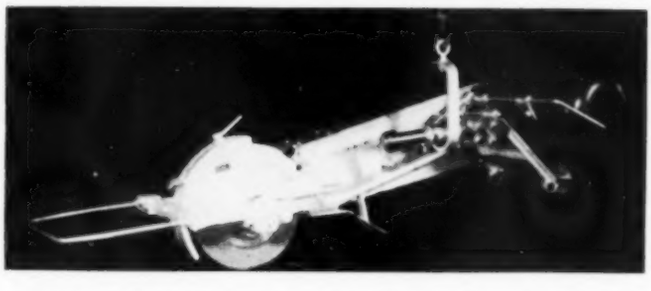

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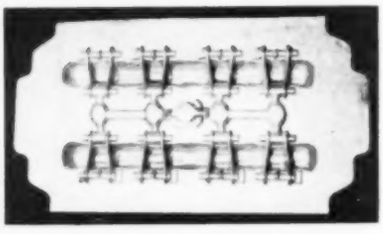

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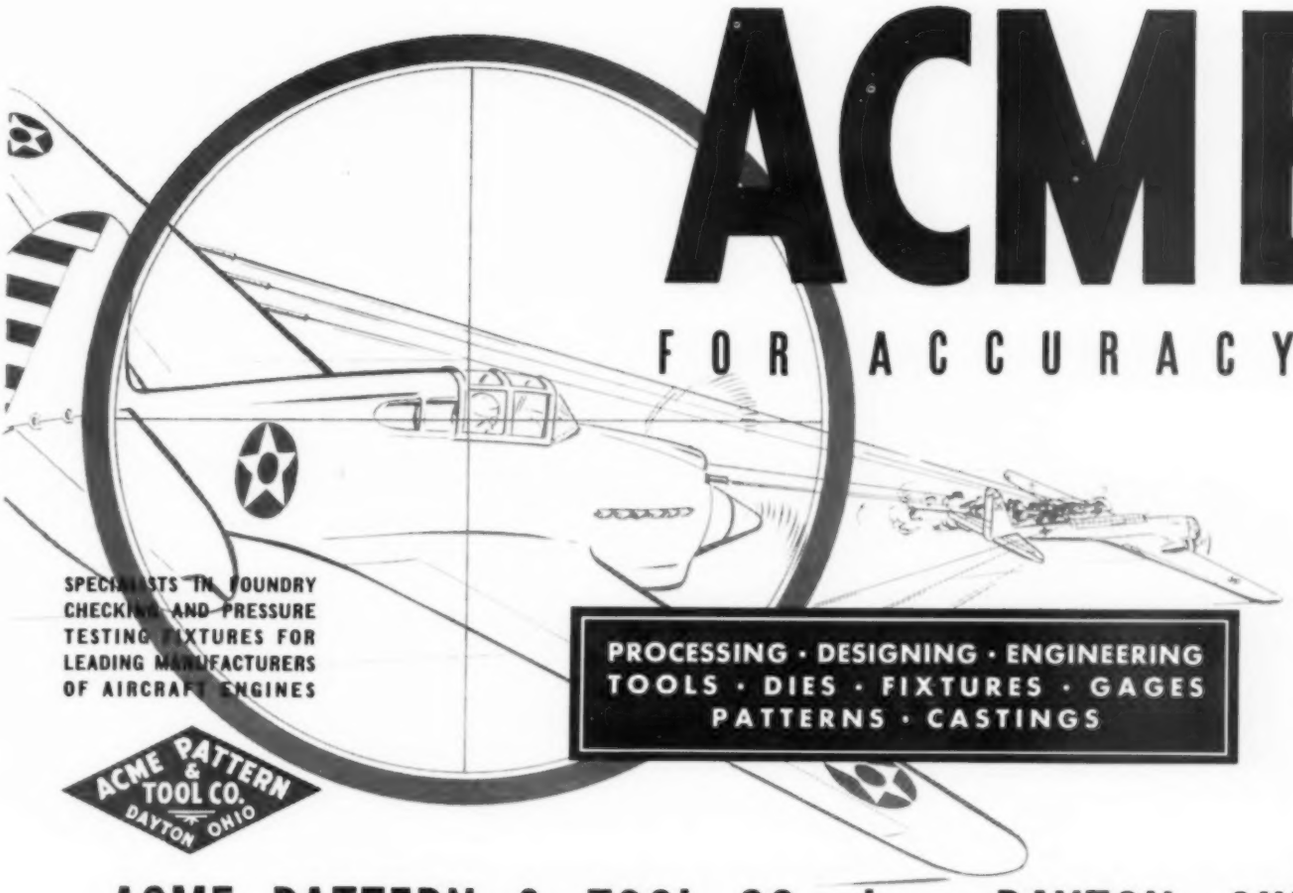

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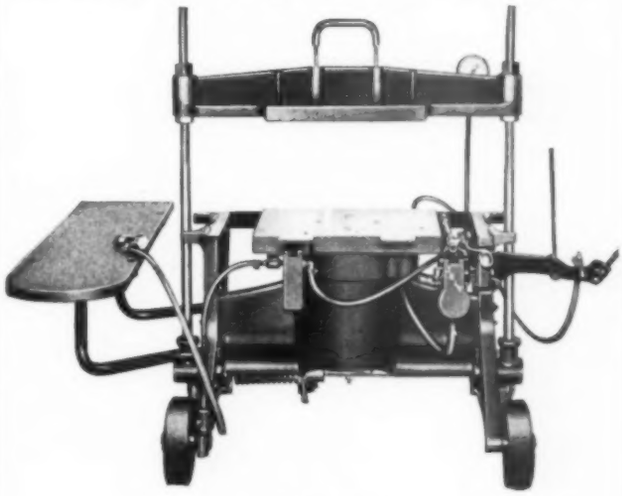

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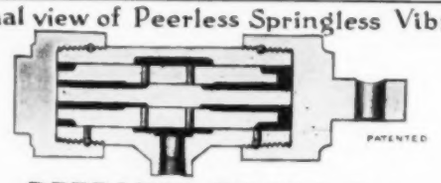

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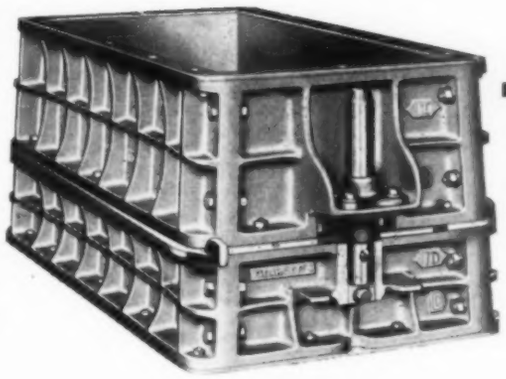

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30—½ to 5-ton, 1 and 2-motor Fl. & Cage operated, 220/440-volts, 3-PH, 60-CY. 110 and 230-VDC.

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1 to 50-ton Cap. 18' to 91'0" span, 220/440-VAC. and 230-VDC. We operate the largest crane Rebuilding Plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

T. B. MacCABE CO.
4304 Clarissa St. Philadelphia, Pa.

For Sale

Are **YOU** in need of foundry equipment?

Do **YOU** have equipment to sell?

Are **YOU** looking for experienced men?

Do **YOU** want to obtain a position?

If **"Yes"** is your answer to any of the above questions, may we offer the services of the Classified Advertising Department of The FOUNDRY? For rates write *today* to:

The FOUNDRY

Classified Advertising Department

Penton Building Cleveland

FOR SALE

1—Pangborn No. 2 type GF blast cleaning barrel, like new. Priced reasonably. Call or write, **Kelly Foundry & Machine Co., P. O. Box 232, Elkins, W. Va.**

FOR SALE

One Pennsylvania compressor, with 50 h.p. motor and starter. Operates 275 r.p.m.; stroke 10"; air pressure 100 pounds; compressor pulley is 60" x 10½" face; motor is 17½" x 11" face; motor speed 870 r.p.m. at full load. Can be seen in operation at present.

The Connecticut Malleable Castings Company, P. O. Box 1454, New Haven, Connecticut.

FOR SALE

1—Practically new Wilbraham cupola blower, geared to 50 h.p.—G. E. motor, mounted on cast iron base $480.00

1—Phillips-McLarens wet pan muller, belt drive $280.00

1—No. 101 Osborn jolter $65.00

For complete list of equipment and description write:

E. A. MEYER
Green Bay, Wisconsin

For Sale

FOR SALE

1—Type "K"-84" American sand cutter, Buda motor
1—20" Davenport jolt stripper
1—24" International type "R" rollover
2—No. 112 Milwaukee jolt squeeze strip
3—No. 11-32 Nichols jolt squeeze strip
5—Arcade "Modern" squeezers
1—No. 104 Milwaukee jolt squeezer.
23—Hand strippers, round or square

CHAMPION FOUNDRY & MACHINE CO.
1314 West 21st St. Chicago, Ill.

FOR SALE

1000 lb. Detroit rocking type electric furnace complete with 300 KVA 4600 volt transformer and panel board.

Address Box 671, The FOUNDRY, Cleveland.

SPECIAL DEFENSE BARGAINS

Wet Tumbling Barrel—N. Ransohoff Co., "Ideal" end loading—end unloading return tumbling barrel motor drive. Barrel 36" x 36"—3 cu. ft. cap., continuous or batch operation. Ideally suited for brass castings.

Air Compressor Unit—8½ x 12 Worthington Vee Belt drive with receiver, starter unloader etc. complete unit. 40 HP 3-60-220 motor.

Fans—Blowers—Exhausters for cooling, ventilation and dust or fumes removal. Multivane Fans in all st'd. makes and styles for large air volumes at low pressures.

Fan or **Centrifugal** style blowers—Maxon-Premix—from No. 1 to No. 6, Spencer Turbine, Am. Blower Co., Sturtevant, Buffalo, Clarage, Ilg etc. for Gas or Oil fuel Combustion.

Rotary Pressure Blowers — Roots-Connersville, Garden City, Green, Piqua, Sturtevant, Am. Gas Furnace Co. etc.

Furnaces for Brass and Aluminum Melting—Hausfeld Tilting open flame 400 lb. brass cap.; Booth Electric 725 lb. brass cap. with instruments. Stationary Furnaces, swing top for crucibles No. 6 to No. 150 and open top for iron pots up to 300 lb. aluminum.

Schwartz Furnaces—1—60" & 1—42".

Molding Machines—Osborn No. 401 stationary, jolt-squeeze-rollover-draw 20" x 30". Osborn No. 404-S, Pit Type jolt-stripper. "Berkshire" 34" wide stationary air squeeze. "Tabor" 8" cyl. air squeeze. "Battenfeld" (Johnston & Jennings) stationary jolt squeeze; 3 in. stock. Arcade—portable one in stock 8 cyl. Adams—Stationary hand squeezers 48" wide 2 in stock. Mumford—Stationary Air Squeeze 14 x 18" platen. Tabor—Hand operated, portable, Rollover, draw for 20 x 30" flasks or core boxes, 3 in stock. Nichols—10" x 32" Stationary.

1—Crane Ladle 4 tons capacity.
1—25 H.P. Diesel Engine, horizontal.
1—Whiting style, 36" x 60" Round Tumbling mill.

Sand Blasts—pressure generator tanks with hose & nozzles. Sly wet Cinder mill.

Sand Blast Barrel—New Haven 36 x 46" for Motor direct connected.

Sand Blast Table—Pangborn 8' dia. self contained fine for brass and iron castings.

Blystone Sand Mixer. 5 cu. ft. cap.

Combs Sand Riddle—1—type CS

Tell us your needs.

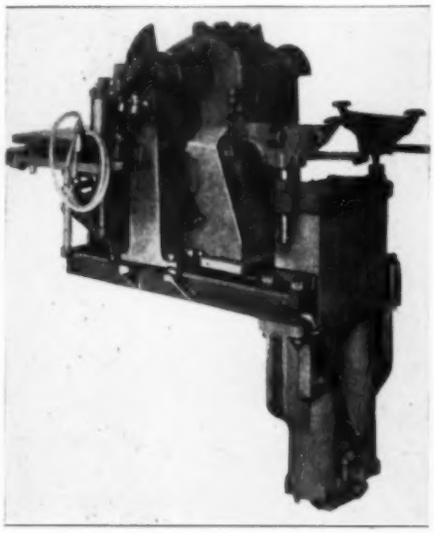
CLIFTON MACHINERY CO.
1023 W. 6th CINCINNATI, O.

"SCULLY-JONES" RECONDITIONED FOUNDRY EQUIPMENT

◆ Ready for immediate shipment, this equipment has been completely rebuilt in our modern machine shop. Prices on request.

INTERNATIONAL MOLDING MACHINES

1 49 x 16" draw Type "F," fitted with air equalizers, rollers in the draw section and hand operated core box clamps, jar plate 100" long. 6000 lbs. cap.



INTERNATIONAL TYPE "F"
(Enclosed Model)

48 x 16" draw Type "F"—4200 lbs. cap. @ 80 lbs., table size 48 x 83".

37 x 16" (adjustable draw, can be set to max. of 25") Type "F" table size 34 x 70", 3800 lbs. cap. @ 80 lbs. press.

42 x 16" draw Type "F" (with double cylinders) 3400 lbs. cap. @ 80 lbs. pressure.

27 x 12" Type "F" International (enclosed cyl. type) 1400 lb. roll-over capacity @ 80 lbs. pressure, 22 x 34" table.

Herman INDEPENDENT TURN-OVER and PATTERN DRAWING DEVICE MACHINES

42 x 72" jar roll-over, 40 x 72" jolt table.
46 x 56" jar roll-over, 40 x 50" jolt table.
40 x 60"—15" dia. cyl. 9500 lbs. cap. @ 80 lbs. press., 42 x 60" jolt table.

CORE MACHINES

Champion Type "CA" stationary Plain Core Jarring Machines, 13½" table, 4" dia. cyl.

No. 832 Milwaukee hand jolt and roll-over, foot draw, portable, 15 x 32" table, max. flask size 24 x 32"—30" height pattern table.

JOLT SQUEEZE & POWER STRIP

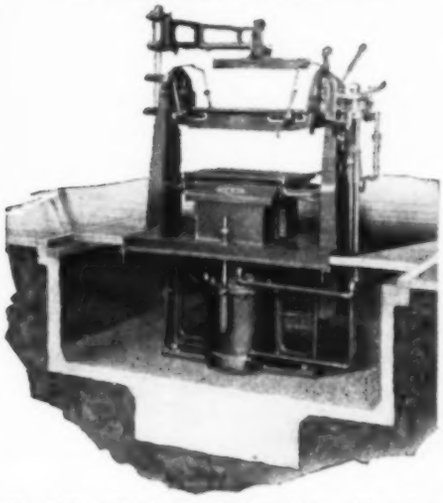
No. 142 Milwaukee, stationary, stripping cap. 1200 lbs. @ 80 lbs. press., draw 6" table 19 x 35"—open end type.

No. 152 Milwaukee, portable, max. pattern draw 6", pattern length 28" width 20", 1200 lbs. cap. @ 80 lbs. press., 22 x 30½" table.

No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary, length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolt. cap. @ 80 lbs. pressure, distance from lifting frame to squeeze head 24¼", flask length 44½", with roll off conveyor.

No. 703-5 Osborn, same as above excepting 17 x 35" table.

OSBORN Molding Machines



No. 332, jolt roll-over and squeeze with roller conveyor attachment, flask cap., max. length 36" width 26" pattern draw 9"—750 lbs. cap. @ 80 lbs.

No. 333, flask cap. max. length 45" width 32" —pattern draw 11", 1400 lbs. cap. @ 80 lbs. press. squeeze cyl. dia. 19".

No. 403-W Osborn jolt roll-over and pattern draw, flask cap. 52 x 36", 12" draw, with swing-out Mold Table, Power Roll-Over.

No. 513-E Osborn Air Jolt and Electric Roll-Over, pattern draw and Run-Out Car, flask length O/A 124" width 72" capacity, width of roll-over table 60"—pattern draw 30"—cap. @ 80 lbs. pressure 12,000 lbs. with 15 HP Motor.

SAND MIXERS-CONDITIONERS-THROWERS

No. 3, 8 ft. dia., 11 x 32" heavy duty type double Mullers, arranged for motor drive, but without motor, with gear reduction and outboard bearing.

Model "B" Royer Sand Separator and Blender, cap. 300 lbs. sand per min., portable, with AC Motor.

Model "D" Royer Sand Separator and Blender, 800 lbs. sand cap. per min., portable with 3/60/220V AC Motor.

ELECTRIC GRINDERS

Black & Decker "Constant Cutting Speed" FLOOR STAND, max. wheel size 24 x 4", ball-bearing spindle, with 10 HP 230V 1035 RPM DC Motor, totally enclosed. Push Button Control with Magnetic Type Starter.

Murray A-92 VERTICAL DISC GRINDER, take 26" dia. disc, ball-bearing, 10 HP 3/60/440V AC Motor, with counterweight for extra shaft.

SANDCUTTER

American Fdry Model "AA" Sandcutter size 72, 62" cutting cyl. 68" between tractor wheels, with 10 HP 220V AC Motor Cable and Take-Up Reel.

OVERHEAD ELECTRIC TRAVELING CRANES

50-ton Morgan approx. 35 ft. span Power House Type 4-motors, 600V DC Motors with Aux. Hoist, chain on main drum.

25-ton Walker 55 ft. span with 5-ton Aux. 550V DC Motors, girders single web const. truck ends with large steel wheels, chain on main drum, 3-motors.

5-ton Armington 26' 6" span, 2-motor type, 220V AC Motors, floor operated, 18" "I" Beams, trolley hand racked.

5-ton Shepard Class "B" 18'5" span, 1-motor, floor control, 6 HP 220V DC, trolley hand racked, bridge hand racked.

2-ton Detroit Ice House Type, 26 ft. span, "I" Beam Bridge Type Girders, 3-motors, 3/60/220V AC, floor oper. 10 ft. lift.

ELECTRIC HOISTS

1000 lb. Shepard equipped with 2HP 220V AC Motor, floor control.

1-ton Shepard Lift-A-Bout equipped with Trolley, 2½ HP Zobell 110V DC Motor, floor oper., 18 ft. lift.

1-ton Shepard Lift-A-Bout equipped with Cleveland Electric Tramrail Trolley, 3 HP 220V AC, floor cont. 15 ft. lift.

1½-ton American Motor Driven Trolley, Motors 440V AC, floor operated.

3-ton Detroit Top Hook, with Watson 5 HP 230V DC Motor, 12 ft. lift.

5-ton Detroit Top Hook, floor cont. with 6½ HP 230V DC Motor.

B&P MOTIVE TYPE SANDSLINGER, cap. 7-10 ft., 12 ft. arm, 220V AC Motors—complete unit.

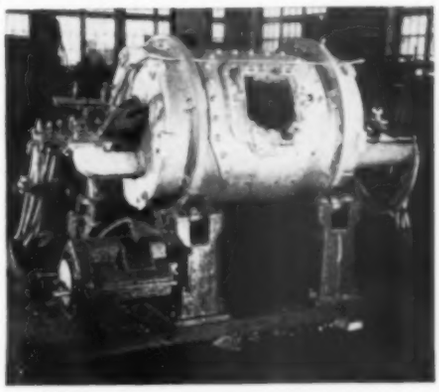
HERMAN BUMPERS

60 x 72" table, 15,000 lbs. cap. @ 80 lbs. press., 19½" dia. cyl.

50 x 50" table, 6100 lbs. cap. @ 80 lbs. pressure.

40 x 50" table, 6400 lbs. cap. @ 80 lbs. press., 13" dia. cyl.

DETROIT ELECTRIC FURNACE



Detroit 350 lb. Rocking Type ELECTRIC FURNACE complete with Transformer 200 KVA. 2300 volt, 90 volt secondary, oil circuit breaker and instrument panel.

Above items represent but a portion of our used or reconditioned FOUNDRY and INDUSTRIAL EQUIPMENT BARGAINS . . . Send for our current STOCK LIST No. 69 which shows COMPLETE STOCK on hand at our CHICAGO WAREHOUSE and advise as to your exact requirements.

SCULLY-JONES & COMPANY (Foundry Division) 19th & ROCKWELL STS.
PHONE LAWNDALE 8770 — CHICAGO, ILLINOIS

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PARSONS ★★ OVAL BAG DUST ARRESTORS

patrol and control the air in your plant, eliminating the greatest "yellow peril" now menacing employees, equipment and plants – dust and dirt.

Parsons "Ovals" are the result of nearly a quarter of a century of engineering experience in the dust arresting business. In hundreds and hundreds of cases throughout the country Parsons Oval Bag dust arrestors are still carrying on efficiently day in and day out, after years and years of hard usage.

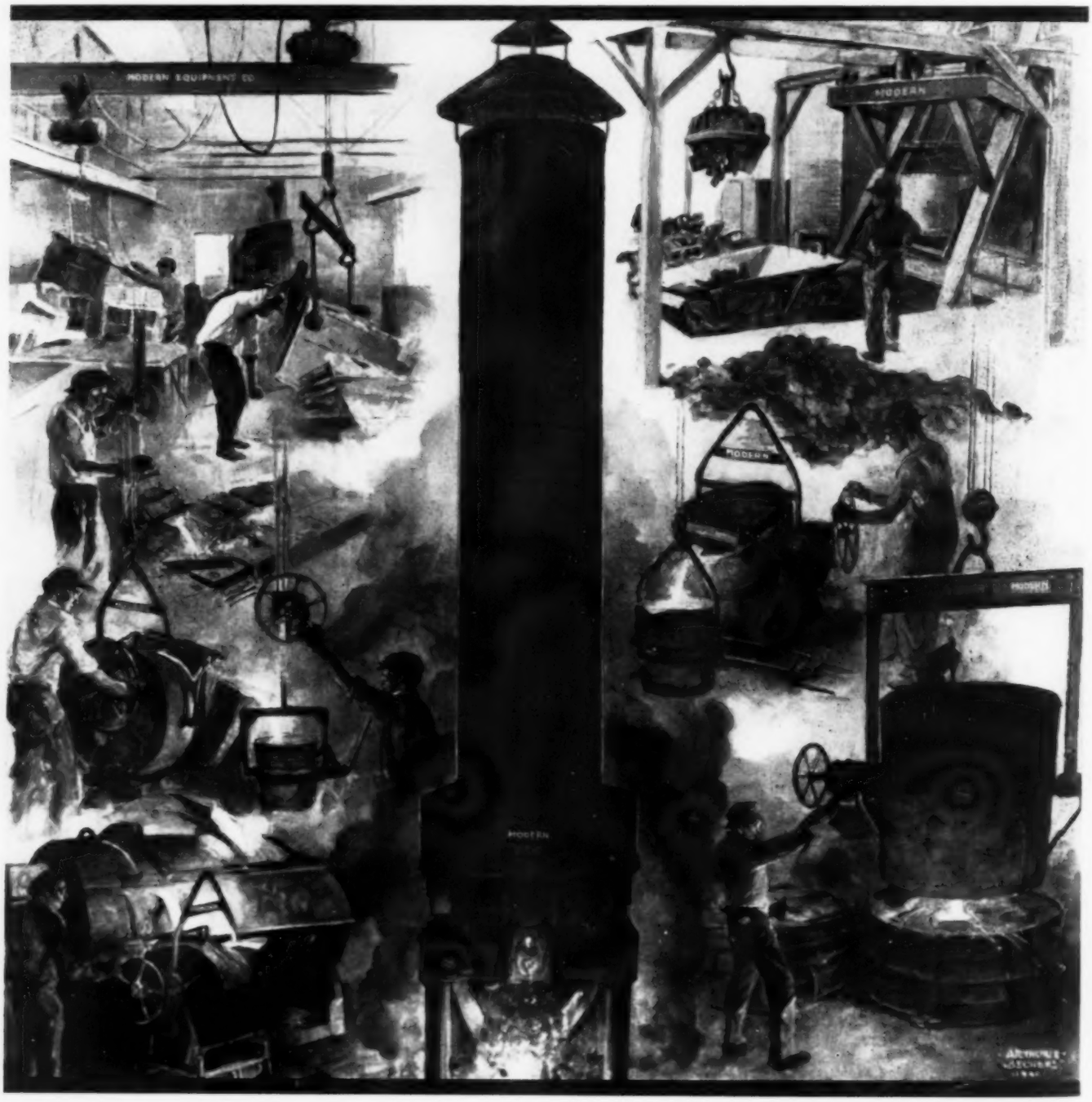
Parsons Ovals stay young and efficient in filtering capacity for years because they will not plug when handling dust, even from moist materials. If it's more production, more man hours, less breakdowns, plus protection for employees, machinery and plant you want, the solution is Parsons Oval Bag dust arrestors. We can prove it to your own satisfaction.

Write for new free dust arrestor bulletin "Mastery of the Air" or better yet call in one of our engineers and without any obligation whatever he will gladly show you how Parsons Ovals pay big dividends.

PARSONS
Engineering
CORPORATION
2545 E. 79th STREET · CLEVELAND, OHIO

Include a MODERN CUPOLA
In your Victory Campaign

MODERN offers you a complete line of metal melting, handling, and pouring equipment. Write now for catalogues.



MODERN Cupolas
Cupola Chargers

MODERN EQUIPMENT COMPANY
Dept. 191

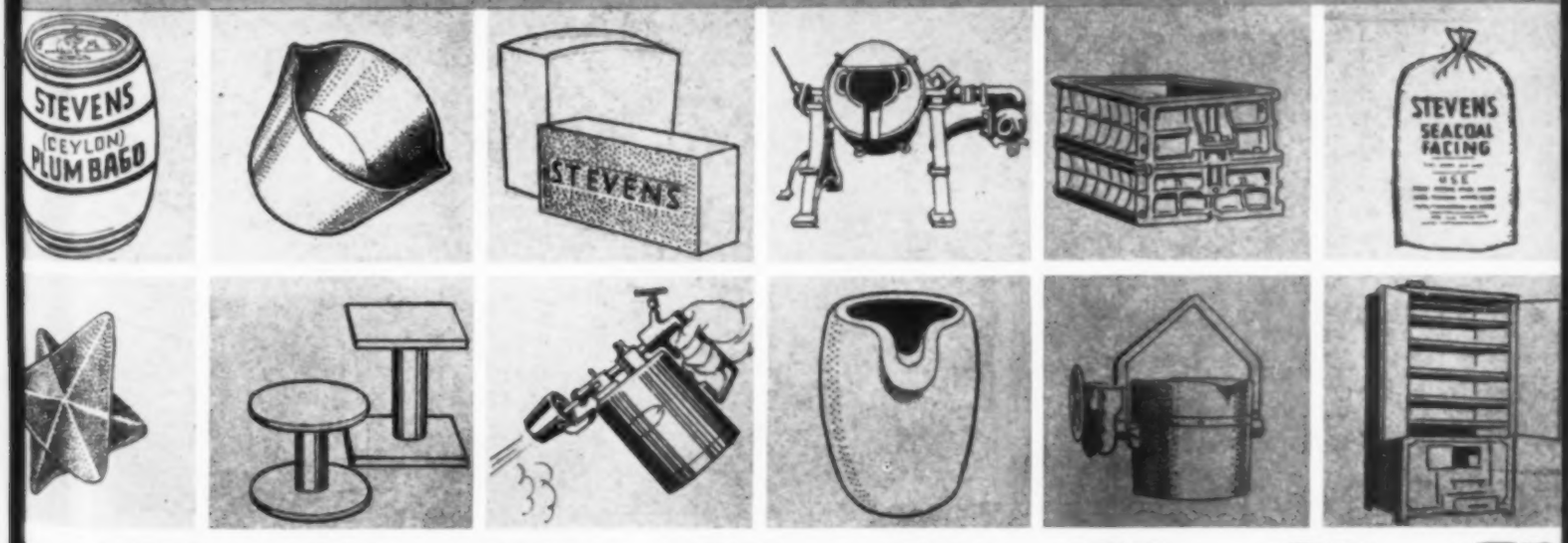
Lifetime Geared Ladles
Improved Bottom Pour Ladles
Metal Pouring Systems

Crane & Monorail Systems for Metal & Mold Handling
Furnace Charging Cranes

MODERN EQUIPMENT CO.
PORT WASHINGTON, WIS.

"Everything for a Foundry"

Buy DEFENSE BONDS



FREDERIC B. STEVENS, INC.

Detroit, Michigan

- NEW ENGLAND . . . . 166-182 Brewery St., New Haven, Conn.
- NEW YORK and PENNSYLVANIA . . 93 Stone St., Buffalo, N. Y.
- INDIANA . Hoosier Supply Co., 36 S. Cruse St., Indianapolis, Ind.
- CANADA . . Frederic B. Stevens of Canada, Limited
- 1262 McDougall St. . . . . Windsor, Ontario
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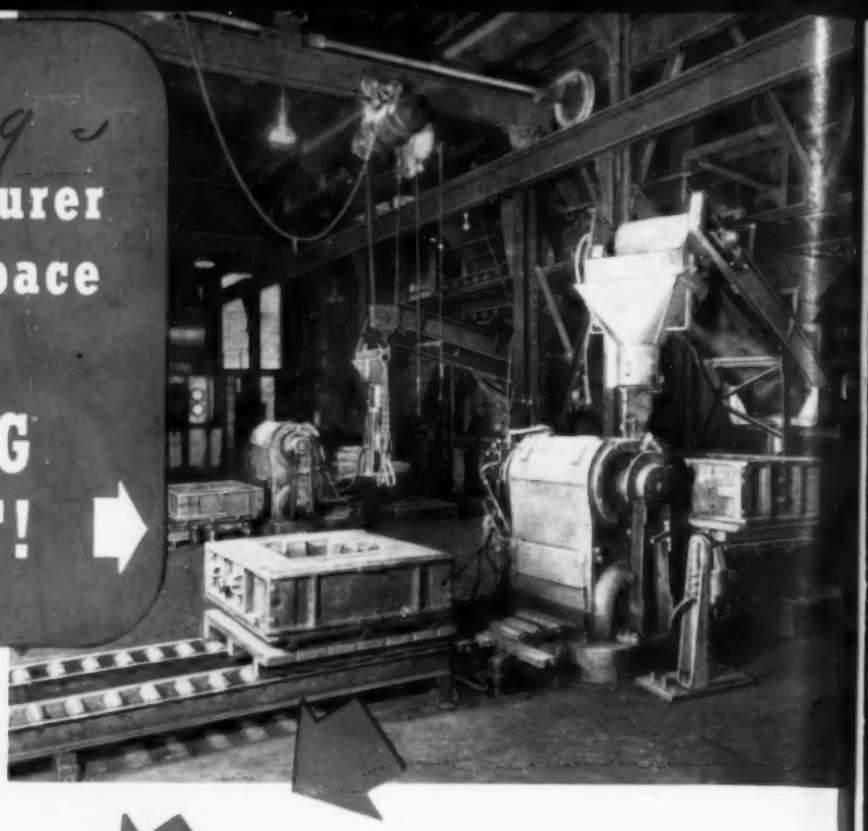
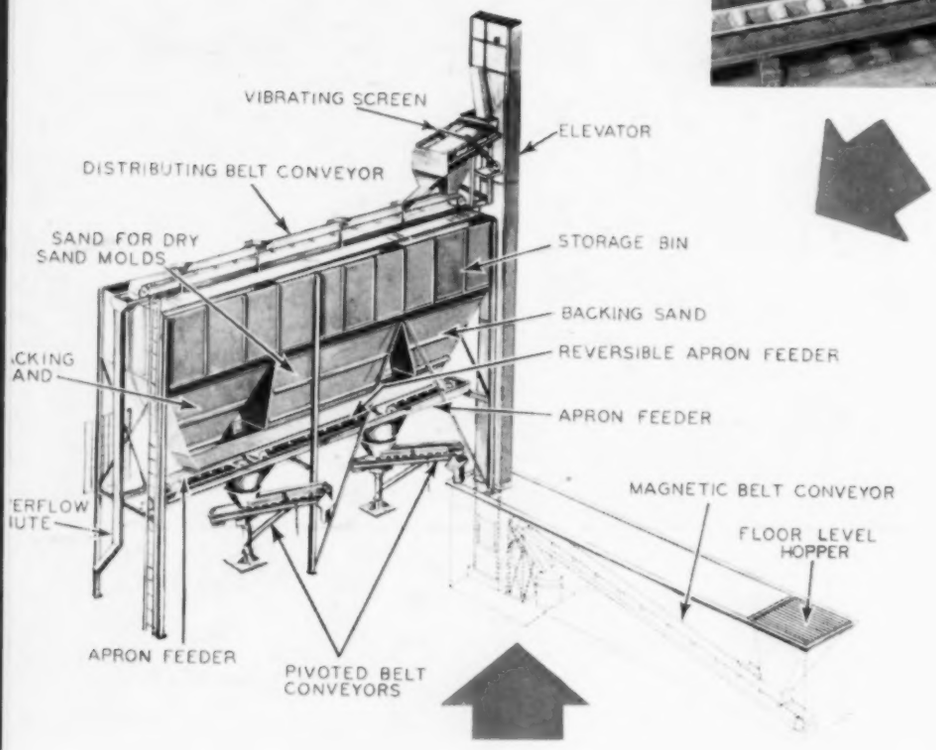
HOW Machine Tool Manufacturer Utilized Waste Floor Space TO STEP UP ROLL-OVER MOLDING MACHINE OUTPUT!





HOW IT OPERATES

Prepared backing sand is handled from hopper to bins via magnetic belt conveyor and bucket elevator, as shown. At the head of the elevator it is passed over a vibrating screen for further aeration as well as cleaning. The distributing belt conveyor deposits the sand into the proper bin through the use of plows operated by hand from the foundry floor. Sand for dry sand molds is fed through the system in the same manner except that it by-passes the screen, going direct to its bin.

● Have you any odd places in your foundry that can be turned into producing areas?

A well-known machine tool manufacturer stepped-up vital war production with this Link-Belt sand handling unit which serves two roll-over molding machines in an isolated corner of the foundry. Most of the equipment—bins and bucket elevator—were placed in an areaway between two buildings.

Both backing and sand for dry sand molds are handled through this system to separate bins and supplied to the flakes by means of two swivel belt conveyors, shown in the illustrations. These can be swung out of way of the overhead crane when removing molds.

Let us tell you more about this and other recent Link-Belt sand, mold and castings handling installations that are aiding in the battle for production.

LINK-BELT COMPANY

Chicago Philadelphia Indianapolis San Francisco Atlanta Dallas Toronto
Offices, warehouses and distributors in principal cities

8021

LINK-BELT

EQUIPMENT for MATERIALS HANDLING - - SAND PREPARATION

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